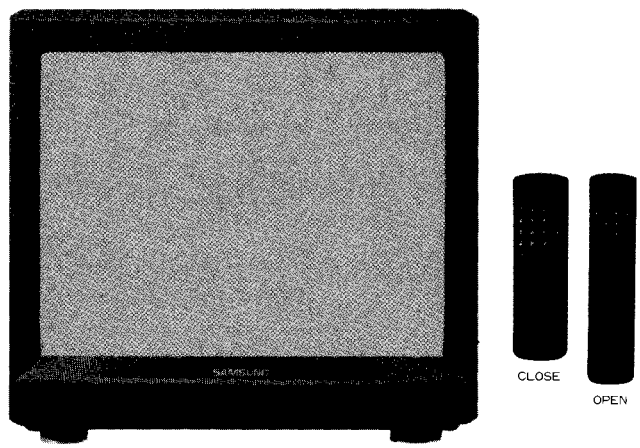
SAMSUNG ELECTRONICS

SERVICE MANUAL

CHASSIS : P68AT & RM109,TTX

COLOUR TELEVISION RECEIVER



SPECIFICATIONS

Television System : PAL - B/G REMOTE CONTROL SYSTEM

Receiving Channel :

System / Band	PAL - B/G
VHF	2 - 12
UHF	21 - 69

Intermediate Frequency :

System / I-F Carrier Frequency	PAL - B/G
Picture I-F Carrier	38.90
Sound I-F Carrier	33.40
Colour Sub Carrier	34.47

(Units:MHz)

Picture Tube : 21" A51KQJ63X/54HGB99X diagonal measured, Quick-start, In-line-gun, Black stripe, 90° degrees deflection

Power Requirements : AC 230V, 50Hz, 85WATT

Antenna Input Impedance : VHF,UHF : 75 Ohm unbalanced type

Speaker : Impedance : 8 Ohm , 3W

Features : Voltage synthesized tuning System, On-screen Display, Auto-fine Tuning, Dark Tube, Auto Brightness Control, 38-Key Transmitter.

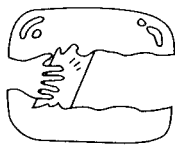
SAFETY CAUTION :

Before servicing this model, it is important that a service technician reads and follows the "Safety Precaution" and "Product Safety Notice" in this Service Manual.

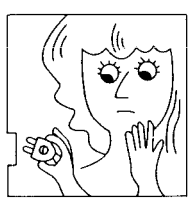
* For continued X-radiation, replace the picture tube with original type.
* Design and specifications are subject to change without prior notice.
* WARNING-SHOCK HAZARDS - Use an isolation transformer when servicing.

For Safe Use

1. Read all of these instructions.
2. Save these instructions for later use.
3. Unplug this television receiver from the wall outlet before cleaning. Do not use liquid or aerosol for cleaning.



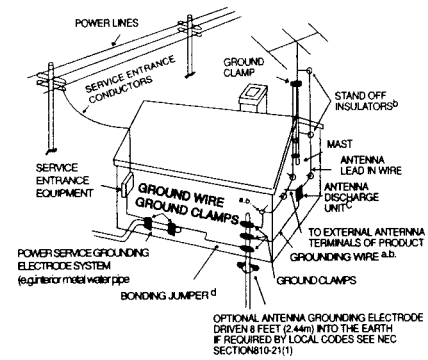
4. Do not use attachments not recommended by the television receiver manufacturer as they may cause hazards.
5. Do not use this television receiver near water for example, near a bathtub, washbowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, etc.
6. Do not place this television receiver on an unstable cart, stand, or table. If the television receiver falls, it may cause serious injury to a child or an adult, and serious damage to the appliance. Use only with a cart or stand recommended by the manufacturer, or sold with the television receiver. Wall or shelf mounting should follow the manufacturer's instructions, and should use a mounting kit approved by the manufacturer.
7. Slots and openings in the back and bottom of the cabinet are provided for ventilation, and to insure reliable operation of the television receiver and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the television receiver in a built-in installation such as a bookcase unless proper ventilation is provided.
8. This television receiver should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supplied to your home, consult your television dealer or local power complany. For television receivers designed to be operated from battery power refer to the operating instructions.



9. This television receiver is equipped with a polarized alternating-current line plug(a plug having one blade wider than the other.) This plug will fit the power outlet only one way. This is a safe feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug still doesn't fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose on the polarized plug.

If your television receiver has a threewire grounding-type plug, please note the following. This television receiver is equipped with a 3-wire grounding type plug(a plug having a third(grounding) pin). This plug will only fit into a grounding type power outlet. This is a safe feature. If you are unable to insert the plug into the outlete, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding plug.

FIGURE 1.
EXAMPLE OF ANTENNA GROUNDING ACCORDING TO NATIONAL ELECTRICAL CODE INSTRUCTIONS CONTAINED IN ARTICLE 810 - "RADIO AND TELEVISION EQUIPMENT"


POWER LINES
SERVICE ENTRANCE CONDUCTORS
GROUND CLAMP
STAND OFF INSULATORS[b]
MAST
ANTENNA LEAD IN WIRE
SERVICE ENTRANCE EQUIPMENT
GROUND WIRE GROUND CLAMPS [a,b]
ANTENNA DISCHARGE UNIT[c]
TO EXTERNAL ANTERNNA TERMINALS OF PRODUCT
GROUNDING WIRE [a,b]
POWER SERVICE GROUNDING ELECTRODE SYSTEM (e.g.nterior metal water pipe
GROUND CLAMPS
BONDING JUMPER [d]
OPTIONAL ANTENNA GROUNDING ELECTRODE DRIVEN 6 FEET (2.44m) INTO THE EARTH IF REQUIRED BY LOCAL CODES SEE NEC SECTION810-21(1)

NOTES :

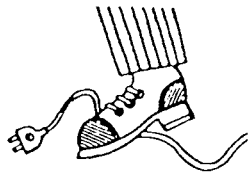
a. Use No. 10 AWB(5.3mm2) copper, No. 8 AWG(8.4mm2) aluminum. No. 17 AWG(1. 0mm2) copperclad steel or bronze wire, or larger, as a ground wire.

b. Secure antenna lelad-in and groundwires to house with stand-off insulators spaced from 4-6 feet(1.22-1.83m) apart.

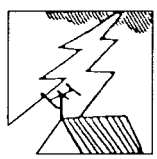
c. Mount antenna discharge unit as close as possible to where lead-inenters house.

d. Use jumper wire not smaller than No. 6 AWG(13.3mm^2) coppper, or the equivalent, when a separate antennagrounding electrode is used.

10. Do not allow anything to rest on the power cord. Do not locate this television receiver where the cord will be abused by persons walking on it.



11. Follow all warmings and instructions marked on the television receiver.
12. If an outside antenna is connected to the television receiver, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, NFPA No. 70-1975 provides infomation with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of an antenna dicharge unit, connection to grounding èlectrodes, and requirements for the grounding electrodes. See Figure 1.



13. For added protection for this television receiver during a lightening storm, or when it is unattended and unused for a long period of time, unplug it form the wall outlet and disconnect the antenna. This will prevent the receiver from damages due to lightning and power-line surges.
14. An outside antenna system should not be located in the vicinity of overhead power lines, other electric light, power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system, extreme care should be taken to keep from touching such power lines or circuits as contact with them might be fatal.
15. Do not overload wall outlets and extension cords as this can result in a fire or an electric shock.
16. Never push any kinds of objects into this television receiver through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a fire or an electric shock. Never spill any kinds of liquid on the television receiver.
17. Do not atempt to service this television receiver yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all service to a qualified service personnel.
18. Unplug this television receiver from the wall outlet and refer service to a qualified service personnel under the follwing conditions:
    a. When the power cord or plug is damaged or frayed.
    b. If liquid has been spilled into the television receiver.
    c. If the television receiver has been exposed to rain or water.
    d. If the television receiver does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as improper adjustment of other controls may result in damage and will often requir extensive work by a qualified technician to restore the television receiver to the normal operation.
    e. If the television receiver has been dropped or the cabinet has been damaged.
    f. When the television receiver exhibits a distinct change in perfomance, this indicates a need for service.
19. When replacement parts are required, be sure the service technician has used the replacement parts specified by the manufacturer that have the same characteristics as the original part. Unauthorized substitutions may result in a fire, an electric shock, or other hazards.
20. Upon completion of any service or repairs to this television receiver, ask the service technician to perform routine safety checks to determine that the television is in safe operating condition.
21. Television equipment and car combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the equipment and cart combination to overturn.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by visual inspection and the protection afforded by them cannot necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The replacement parts which have these special safety characteristics are identified in this manual and its supplements:

eiectrical components having such features are identified by shading on the schematic diagram and the parts list.

Before replacing any of these components, read the parts list in this manual carefully. The use of subsititute parts which do not have the same safety characteristics in the parts list may create a shock, fire, X-radiation or other hazards.

SERVICE NOTES

1.when replacing the parts or the circuit boards, clamp the lead wires to the terminals before soldering.

2.When replacing a high wattage resistor (oxide metal film resistor) in the circuit board, keep the resistor 10mm (1/2 in) away from the circuit board.

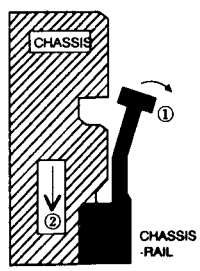
3.Keep the wires away from high voltage or high temperature components.

4.If any fuse in this TV receiver is blown, replace it with the FUSE specified in the chassis parts list.

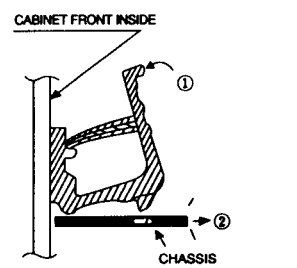
	CAUSION RISK OF ELECTRIC SHOCK DO NOT OPEN	
The lighting flash and arrowhead within the triangle is a warning sign alerting you of "dangerous voltage" inside the product.	CAUTION : To reduce the risk of electric shock, do not remove cover (or back) no user serviceable parts inside. Refer servicing to qualified service personnel.	The exclamation point within the triangle is a warning sign alerting you of important instructions accompanying the product.

* IN CASE OF
3312 SERIES
3313 SERIES
3315 SERIES
3325 SERIES
3327 SERIES
5012 SERIES
5013 SERIES
5015 SERIES
5025 SERIES
5026 SERIES
5027 SERIES
5322 SERIES
5022 SERIES

PULL THE CHASSIS-RAIL TO BESIDE (①) THEN SEPARATE THE CHASSIS (②)



* IN CASE OF
3351 SERIES
3352 SERIES
3357 SERIES
3852 SERIES
3857 SERIES
5051 SERIES
5052 SERIES
5057 SERIES
3362 SERIES
5062 SERIES
5061 SERIES
5361 SERIES
5314 SERIES



AT FIRST PUSH THE LOCK SWITCH,(①)THEN TAKE OUT THE CHASSIS. (②)
CODE NO ; 38114-699-710

X-RADIATION PRECAUTION

1. Excessive high voltage can produce potentially hazardous X-RADIATION. To avoid such hazards, the high voltage must not exceed the specified limit. The norminal value of the high voltage of this receiver is 24.0KV at zero beam current (minimum brightness). The high voltage must not, under any circumstances, exceed 30KV. Each time a receiver requires servicing and the high voltage should be checked following the HIGH VOLTAGE CHECK procedures in this manual. It is recommended that the reading of the high voltage should be recorded as a part of the service record. It is important to use an accurate and reliable high voltage meter.
2. This receiver is equipped with a Fail Safe (FS)circuit which prevents the receiver from producing an excessively high voltage even if the B^+ voltage increases abnormally. Each time the receiver is serviced, the FS circuit must be checked to determine that the circuit is properly functioning, following the FS CIRCUIT CHECK procedures in this manual.
3. The only source of X-RADIATION is this TV receiver. It is the picture tube. For continued X-RADIATION protection, the replacement tube must be exactly the same type as specified in the parts list.
4. Some parts in this receiver have special safety related characteristics for X-RADIATION protection. For continued safety, the parts replacement should be undertaken only after referring to the PRODUCT SAFETY NOTICE.

SAFETY PRECAUTION

Warning : Serivce should not be attempted by anyone unfamiliar with the necessary precautions on this receiver. The followings are the necessary precautions to be observed before servicing this chassis.
Since the chassis of this receiver is directly connected to the AC power line-(Hot chassis), an isolation transformer should be used during any dynamic service to avoid possible shock hazards.

1. Always discharge the picture tube anode to the CRT conductive coating before handling the picture tube. The picture tube is highly evacuated and if broken, glass fragments will be violently expelled. Use shatter proof goggles and keep picture tube away from the unprotected body during handling.
2. When replacing a chassis in the cabinet, always be certain that all the protective devices are put back in place, such as non - metallic control knobs, insulating covers, shields, isolation resistor, capacitor, network, etc.
3. Before returning the set to a customer, always perform an AC leakage current check on the exposed metallic parts of the cabinet, such as antennas, terminals, screwheads, metal overlays, control shafts, etc. To be sure the set is safe to operate without danger of an electrical shock. Plug the AC line cord directly to a AC outlet (do not use a line isolation transformer during this check). Use an AC voltmeter having 5000 ohms per volt or more sensitivity in the following manner: Connect a 1500 ohm 10 watt resistor, paralleled by a 0.15μF, AC type capacitor, between a known good earth ground(water pipe, conduit, etc.) and the exposed metallic parts, one at a time. Measure the AC voltage across the combination of 1500 ohm resistor and 0.15mfd capacitor. Reverse the AC plug at the AC outlet and repeat the AC voltage measurements for each exposed metallic part. The measured voltage must not exceed 0.3 volts RMS. This corresponds to 0.5 milliamp AC. Any value exceeding this limit constitutes a potential shock hazard and must be corrected immediately.

NTSC sample
TOSHIBA
CF 917A

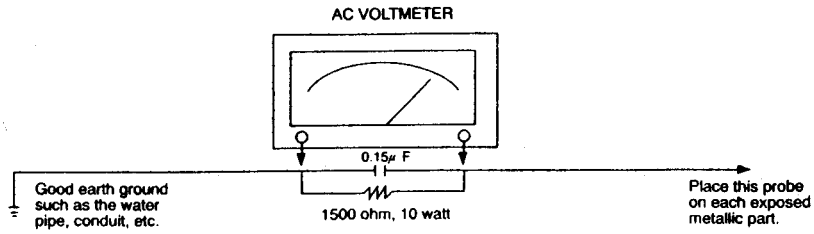

AC VOLTMETER
0.15μ F
Good earth ground such as the water pipe, conduit, etc.
1500 ohm, 10 watt
Place this probe on each exposed metallic part.

Figure 1. AC Leakage Current Check

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MEMO .....

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1.INSTRUCTIONS

1.IC LINE UP

Loc No	Specification	Description	Remarks
IC101	TDA8362	PAL/SECAM Decoder (VIF/SIF/VIDEO,Chroma/H-osc,V-osc)	
IC502	TDA8395	SECAM Decoder	
IC501	TDA4661	1 H Delay	
IC301	KA2131	Vertical output	
RIC01	SPM-109B SPM-133	6Kμ —com (with TTX) 4Kμ —com (W/0 TTX)	
RIC02	X24C02P	NON-VOLATILE Memory (E^2PROM)	
IC102	LA7910	BAND SELECTOR	
IC601	TDA1013A	Sound output Amplifier	
IC801	SDH209B	PWM-Controller for SMPS	
XIC01	SAA3010	Remote Control	

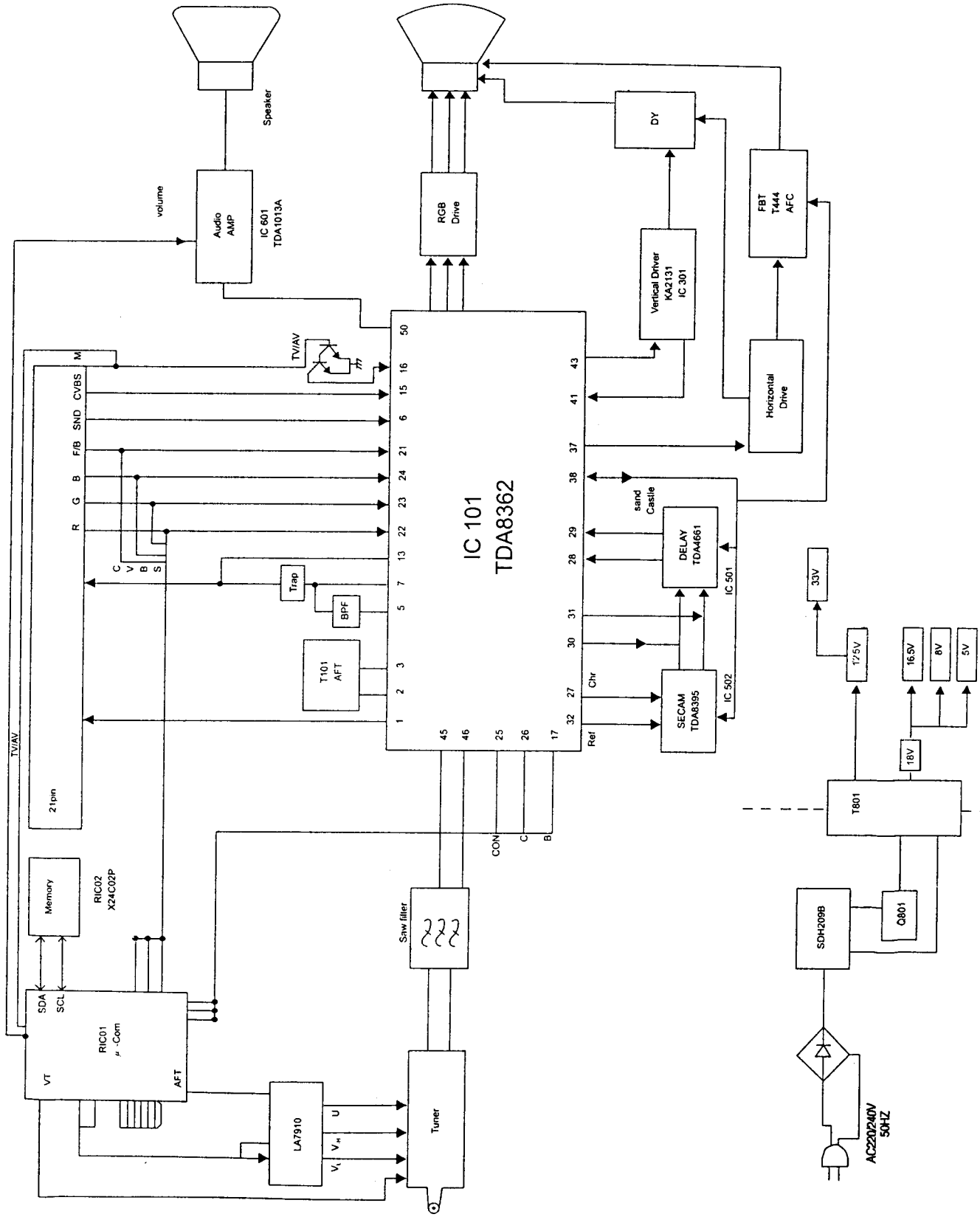
2.MEANS OF COMPONENTS NUMBER SERIES

100 Series ------- TUNER/IF/AFT/AGC processing
200 Series ------- Video/Luminance processing
300 Series ------- Vertical deflection
400 Series ------- Horizontal deflection
500 Series ------- Chroma/peaking processing
600 Series ------- Sound processing
700 Series ------- Video/Chroma switching Section
800 Series ------- AC input, power supply circuits
900 Series ------- CRT Driver Section

3.ABBREVIATION

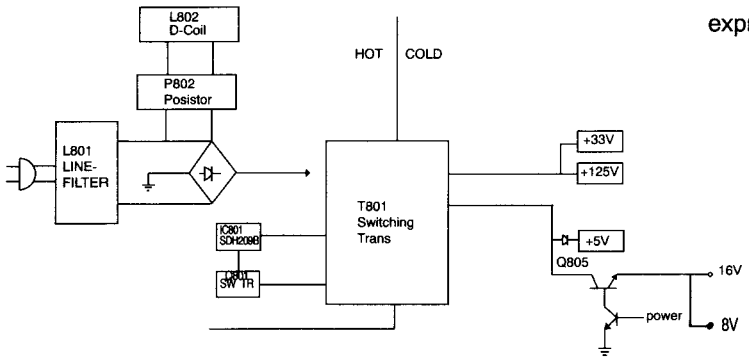
ABCL: Automatic Brightness Contrast Limiting
ABL : Automatic Beam Limiting
AC : Alternating Current
ACC : Automatic Color Control
AFC : Automatic Frequency Control
AFT : Automatic Fine tuning
AGC : Automatic Gain Control
AM : Amplitude Modulation
APC : Automatic Phase Control
APL : Average Picture Level
AVC : Automatic Volume Control
DB : Decibel
DC : Direct Current
DIP : Dual-in-line Package
DY : Deflection York
D/A : Digital to Analog
F.B : Fast Blanking
FBT : Flyback Trans
FM : Frequency Modulation
HDT : Horizontal Drive Trans
IC : Integrated Circuit
IF : Intermediate Frequency
IFT : intermediate Frequency Trans
LLD : Low Level Detector
LPF : Low Pass Filter
MTS : Multi Television Sound
NFB : Negative Feed Back
NTSC : National Television System Comittee System
NVRAM : Non-Valatile Random Access Memory
PAL : Phase Alternating by Line System
PCM : Pulse Coded Modulation
PIF : Picture Intermediate Frequency
PLL : Pulse Locked Loop
PWM : Pulse Width Modulation
RAM : Random Access Memory
RF : Radio Frequency
SAW : Surface Acoustic Wave
SIF : Sound Intermediated Frequency
S/N : Signal Noise
I^2C : Inter Intergrated Circuit
DAC : Digital Analog Convertor
BPF : Band Pass Filter
OSD : On-Screen Display
SCL : Serial Clock Line
SDA : Serial Data Line

2.CHASSIS BLOCK DIAGRAM



3.POWER SUPPLY SECTION

1.BLOCK-DIAGRAM



2.INTRODUCTION

The IC SDH209B controls the bipolar switching transistors and performs all necessary regulation and function in free running flyback converters.

The flyback converter is the most cost saving SMPS for CTV and VCR. But as the frequency goes up according to the increase of the input AC voltage and the reduction of power consumption an abnormal oscillation like intermittent oscillation or over voltage can happen easy unless the frequency rise is restrained.

SDH209B having a built-in mono-multi vibrator which is triggered at transistor switched off and generates a pulse of constant width to keep the transistor off for the pulse period, will keep switching frequency less than 120KHz.

SDH209B having a built-in constant DC current source will achieve the small drive power consumption at higher AC input and achieve the sufficient drive current at lower AC input.

Owing to the above two built-in circuits, SDH209B can get good regulation and high efficiency over a wide AC input range and keep stable oscillation at very small load.

In the standard connections, the constant voltage charged up at the capacitor is used and also used to sense voltage. So, the transformer and circuit are both simple.

Free running frequency of flyback converter is expressed by the following formula.

$$f = \frac{1}{2 \cdot L_P \cdot P_{IN}} \cdot \frac{V^2_{IN}}{\left(1+\frac{ns}{np}\cdot\frac{VIN}{Vo}\right)^2}$$

where, Lp : Primary inductance
Pin : Input power
ns : Secondary winding turns
np : Primary winding turns
Vin : Input DC voltage
Vo : Output DC voltage

As the above formula, the frequency f goes up according to the increase of Vin and the decrease of Pin.

Mono-multi vibrator built-in SDH209B restrains the rise of switching frequency.

This mono-multi vibrator generates 4μsec pulse every end of Ton period.

That is, this mono-multi vibrator is triggered by signal which is produced when the transistor is switched off. The transistor is unable to be switched on again while the mono-multi vibrator's output is high.

While the transistor is off, the primary inductance of transformer and the floating capacitance or capacitor installed across the snubber diode compose a resonant loop and oscillate. This resonant frequncy depends on the primary industance and capacitance.

When 4μsec over, the transistor is released to be switched on again. The time of switch on is approximately 4μsec plus half cycle of resonant frequency from the time of switch off.

Capacitors installed across the snubber diode, across the secondary diodes and across C-E of the transistor affect to the resonant frequency. In order to obtain the stable stand-by oscillation, a total equivalent capacitance is recommended to be less than 330pF. Total equivalent capacitance Ceq is calculated.

$$Ceq = Csn + Sce + \left(\frac{ns_1}{np}\right)^2 \cdot Cs_1 + \left(\frac{ns_2}{np}\right)^2 \cdot Cs_2$$

where, Csn : Across the snubber diode
Cce : Across C-E of the transistor
np : Primary winding turns
ns_1 : Secondary winding S_1 turns
ns_2 : Secondary winding S_2 turns
Cs_1 : Across the diode of S_1
Cs_2 : Across the diode of S_2

Remarks : Capacitance includes a diode junction capacitance and a floating capacitance. Oscillation at no load is stable and its power loss is small because of the above mechanism.

Operation of Over Load

The formula of frequency f shows that f goes down when Vo is smaller than the rated value. When the switch is turned on, Vo starts from zero.

Therefore, the ordinary SMPS makes the whistle sound when starting up.

But, Ton limiter built-in SDH209B limits Ton duration regardless of Vo value.

So, no whistle is made at starting up.

This Ton limiter also works as a protector when the transistor is switching at the overload. Particularly when the input AC voltage is lower than the rated value, Ton becomes longer and the saturation loss increases. But Ton limiter stops becoming longer and protect the transistor from thermal run away.

Operation at Output Short

When the input AC voltage is higher than 220V. Ton limiter is not enough to protect the transistor from the over current. So, the current limiter is provided.

The instantaneous locus at the output short has not been taken clear in the picture. But the locus is expanded to 680V and 3.8A. Therefore, transistor's SOA is required bigger than this point. When the output short is further continued, the locus becomes shrinked and even a dead short will not destroy the transistor.

Because the constant DC current source for base drive is empty due to the dead short and then the transistor does not switch at a large current.

Transformer

1)Primary and Secondary Turn Ratio
The value of (Np/Ns) · Vo is factor to determine switching duty, Ic peak, Vce peak and frequency. The recommended value is like the below

$$\frac{n_p}{n_s} \cdot Vo \fallingdotseq 220$$

2)Leakage Inductance
The recommended value is 1% of the primary industance.

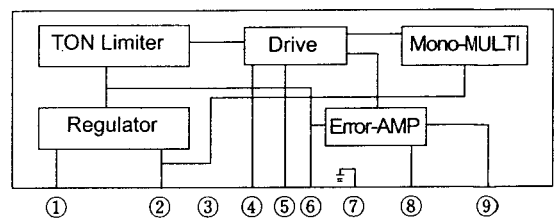
3)Magnetic Saturation Current
The recommended value is bigger than,

$$\frac{4 \times 10^{-3}}{LP} + \frac{0.6}{r}$$

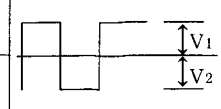
Where, Lp : Primary inductance (H)
r : Current sense resistor (Ω)

3.IC SPECIFICATION (SDH209B)

1)Block-Diagram



2)Electrical Characteristics (Ta=25℃)

Para-Meter	Symbol (unit)	Ratings MIN	Ratings TYP	Ratings MAX	Remarks
Supply Voltage Range Pin 1-2	V1(V)		+10.4		
	V2(V)	-3.0		-18.0	
Output Current	I_3 (mA)		73		
Reference Voltage	V^4 (V)	8.5	8.8	9.1	
Reference Voltage Ambient Temperature	Kt(mv/℃)		-3.0		
Mono Multi Frequency	$T_1(\mu s)$		7.5		
Ton Limit	$T_2(\mu s)$	18	22	26	
Current protection	V_8 (V)		-0.6		
Reference Voltage Adjust Range	V_4 (V)	8.0		10.0	

4. CHROMA, VIDEO, IF, SOUND, DEFLECTION SECTION

1.IC SPECIFICATION (TDA8362)

1)Introduction

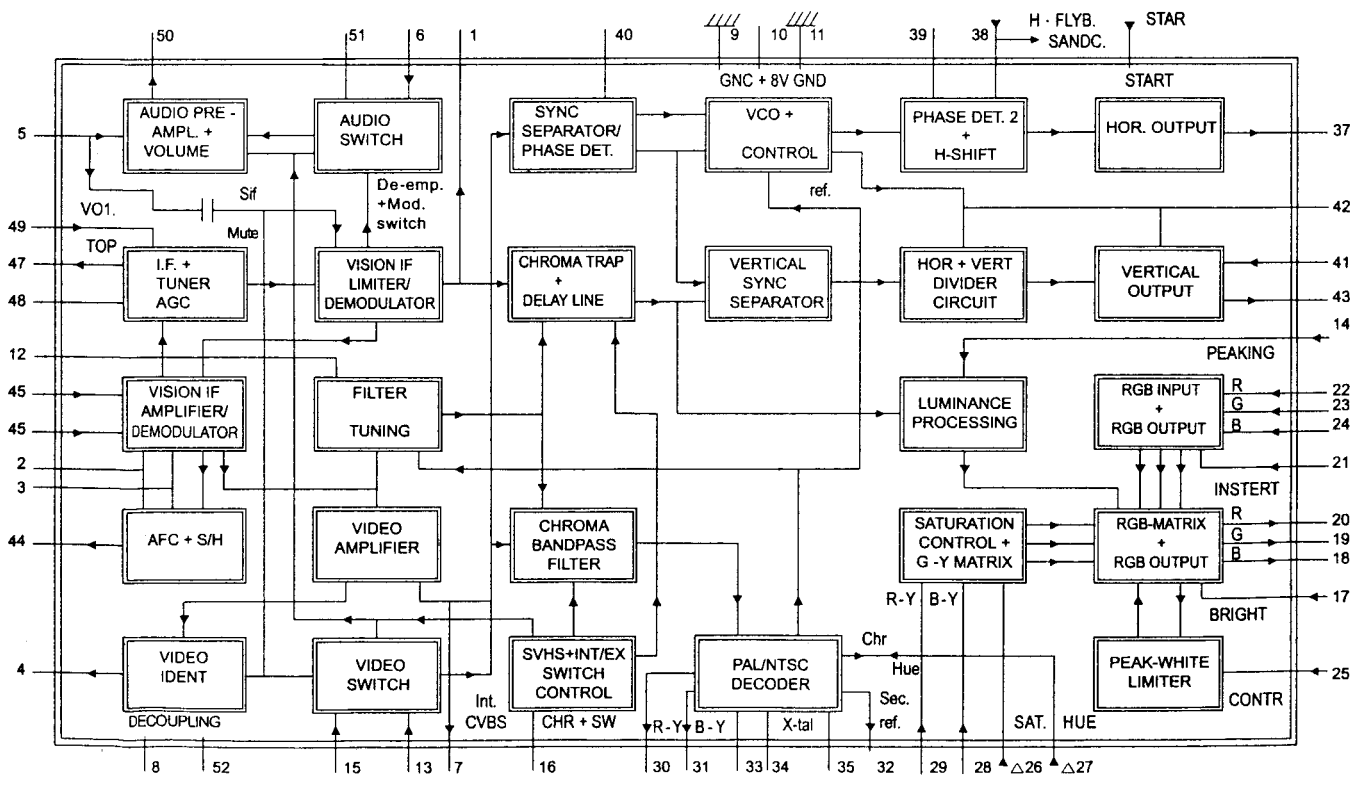
a) General Description

Vision IF amplifier, video demodulator, video amplifier, AGC and AFC are suitable for both negative and positive modulation.
Sound limiter, demodulator and amplifier with volume control.
Inputs and switches for external audio and CVBS signals.
Synchronization circuit with drive circuits for horizontal and vertical deflection.
Separate supply pin for starting the horizontal oscillator from the main rectifier.
X-ray protection (combined with the 2nd phase detector pin).
PAL/NTSC colour decoder in which the chroma filters (bandpass and trap) and the luminance delay line have been integrated. The circuit has a separate chroma input and the filters can be switched-off so that S-VHS signals (via an external switch) can be applied to the IC.
For SECAM applications an(alignment-free) SECAM-decoder can be added to the IC.
Peaking circuit in the luminance channel.
RGB-output circuit with linear inputs for On-Screen Character Display.
The supply voltage for the IC is 8 Volts. It is mounted in an S-DIL envelope with 52 pins.

b)Features

- Multi-standard vision IF circuit (positive and negative modulation)
- Multi-standard FM sound demodulator (4.5MHz to 6.5 MHz)
- Video and audio switches (CVBS int/ext, S-VHS and audio int/ext)
- Integrated chroma trap and bandpass filters (auto-calibrated)
- Luminance delay line integrated
- PAL/NTSC colour decoder with automatic search system
- Easy interfacing with the TDA 8395 (SECAM decoder) for multi-standard applications.
- RGB-control circuit with linear RGB inputs and fast blanking
- Horizontal synchronization with two control loops and an alignment-free horizontal oscillator Vertical count-down circuit and a vertical pre-amplifier
- Low dissipation (only 600 mW)
- Small amount of peripheral components compared with completion IC's.
- Only one adjustment (vision IF demodulator)

2)Block-Diagram

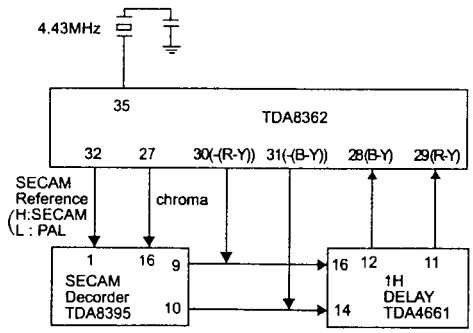


3)Pin Function

No	Function	No	Function
1	Audio deemphasis	52	Decoupling bandgap supply
2	IF-demodulator tuned circuit	51	Decoupling sound demodulator
3	IF-demodulator tuned circuit	50	Audio output
4	Video indentification output	49	Tuner take-over adjustment
5	Sound IF in plus volume control	48	AGC decoupling capacitor
6	External audio input	47	Tuner AGC output
7	IF video output	46	IF-input
8	Decoupling digital supply	45	IF-AFC output
9	Ground	44	AFC output
10	Positive supply (8 V)	43	Vertical output
11	Ground	42	Vertical ramp generator
12	Decoupling filter tuning	41	Vertical feedback input
13	Internal CVBS input	40	Ø-1 loop filter
14	Peaking control input	39	Ø 1- loop filter
15	External CVBS input	38	Flyback input / sandcastle output
16	Chroma + A/V switch input	37	Horizontal output
17	Brightness control input	36	Start horizontal oscillator
18	B-output	35	4.43MHz X-tal connection
19	G-output	34	3.58MHz X-tal connection
20	R-output	33	Loop filter burst phase detector
21	RGB-insertion and blanking input	32	4.43MHz output for TDA 8395
22	R-input for insertion	31	B-Y output signal
23	G-input for insertion	30	R-Y output signal
24	B-input for insertion	29	R-Y input signal
25	Contrast control input	28	B-Y input signal
26	Saturation control input	27	Hue control input (or chroma out)

2.CHROMA VIDEO SECTION

1)Block-Diagram



2)Actuating Description

- Colour Decoder

The colour decoder contains an alignment-free X-tal oscillator, a dual killer circuit and the colour difference signals demodulators. The decoder adapts automatically for PAL and NTSC signals. Two X-tal pins are present so no external switching is required. With the SECAM add-on decoder TDA8395 an alignment free multi-standard decoder can be built with an automatic selection. This makes the application of the TDA8362 very flexible. The following applications are possible:

- PAL/SECAM:

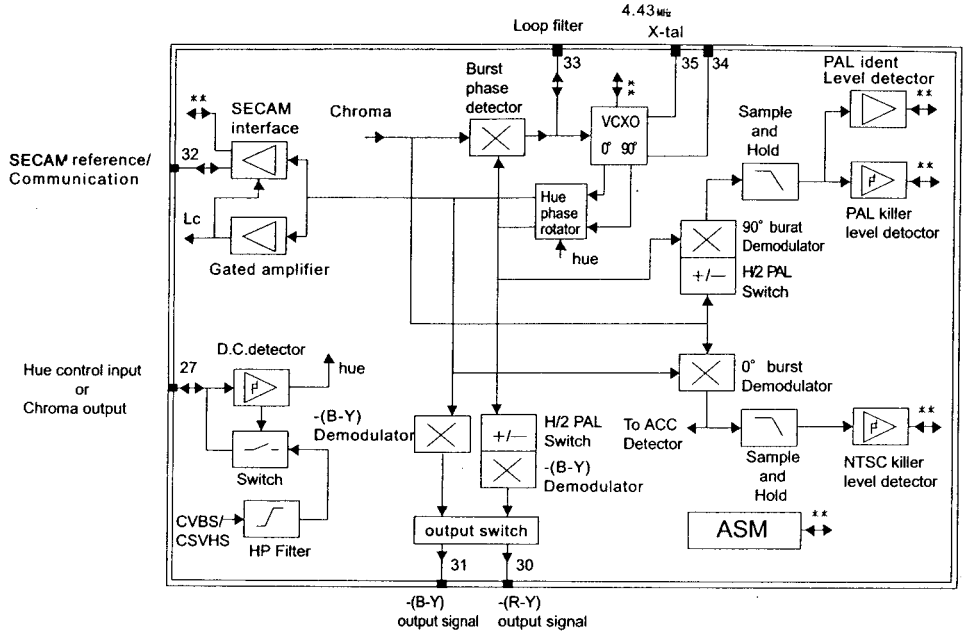
In this application pin 27 is not used for Hue-control but for the chroma signal for the SECAM add-on circuit. Pin 27 has to be connected to the supply line 8V via a series resistor of 10kΩ. Together with the alignment-free SECAM add-on circuit TDA8395 a PAL/SECAM decoder is realized.

The burst phase detector locks the X-tal oscillator with the burst sighal. Two gain modes provide an increased catching range when the PLL is unlocked and a low ripple voltage and a good noise immunity when the PLL is locked.

The burst phase detector operates during the burst key period only, to prevent the PLL from being disturbed by the chroma signal.

The killer circuit switches off the R-Y and B-Y demodulators at too low input signal condition (burst amplitude). Proper hysteresis prevent the constant on/off switching at a certain input level.

3)IC Block-Diagram(TDA8362)



4)IC Specification(TDA8395)

a)Introduction

The TDA8395 is an alignment-free SECAM colour decoder and can be used in conjunction with the TDA8362. It includes the Cloche filter, demodulator and identification circuit. The TDA8395 application needs very few external components, the deemphasis is internally calibrated.

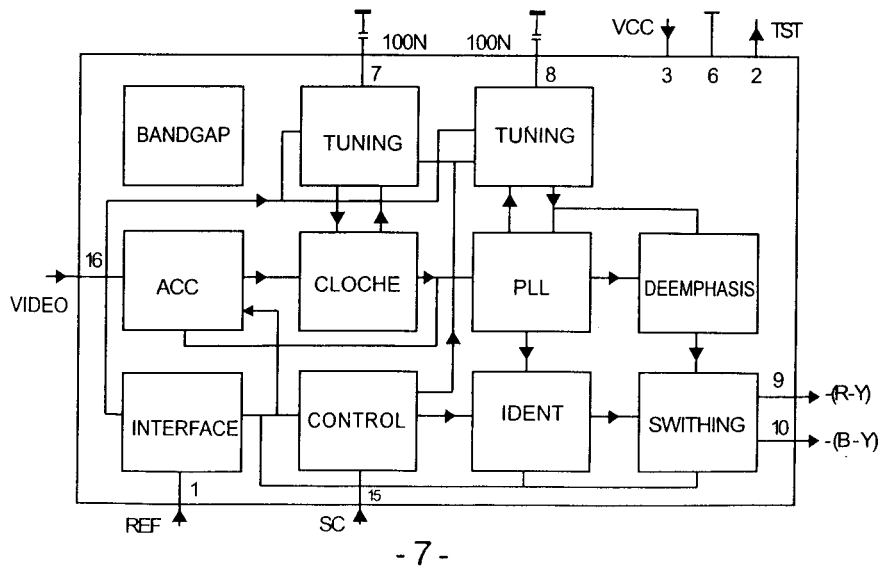
The cloche filter is a gyrator-capacitor type filter. Its resonance frequency is controlled during the calibration period and offset during scan for the right resonance frequency. The required reference frequency for calibration must be connected at pin 1 and is obtained from the TDA8362 (pin 32).

The two(or three)-level sandcastle pulse has to be connected at pin 15 (TDA8362 pin38) and is used for blanking periods and provides the clock information for the identification circuit.

The chroma signal at pin 16 connected to pin 27 of TDA8362, is demoduleted by a PLL demodulator, which uses the reference frequency and a bandgap reference to force the PLL to the desired demodulation characteristic.

Digital line identification is implemented to check the incoming signal for SECAM. If SECAM is detected, pin 1 will sink a current of 150μA. Together with the TDA8362 the voltage at this pin will become high (5.5V). In this case the colour difference signal outputs will be switched on. These outputs will be disconnected and the high-ohmic when no SECAM is detected for two frame periods, the demodulator will be initialized before trying again.

b)Block-Diagram



c)Pin Function

No	SYMBOL	Function
1	f_{ref}/IDENT	reference frequency input/identification input
2	TEST	test output
3	Vp	positive supply voltage
4	n.c.	not connected
5	n.c.	not connected
6	GND	ground
7	CLOCHEref	Cloche reference filter
8	PLLref	PLL reference
9	- (R-Y)	- (R-y) output
10	- (B-Y)	- (B-Y) output
11	n.c.	not connected
12	n.c.	not connected
13	n.c.	not connected
14	n.c.	not connected
15	SAND	sandcastle pulse input
16	CVBS	video (chrominance) input

5)IC specification (TDA4661)

a)Introduction

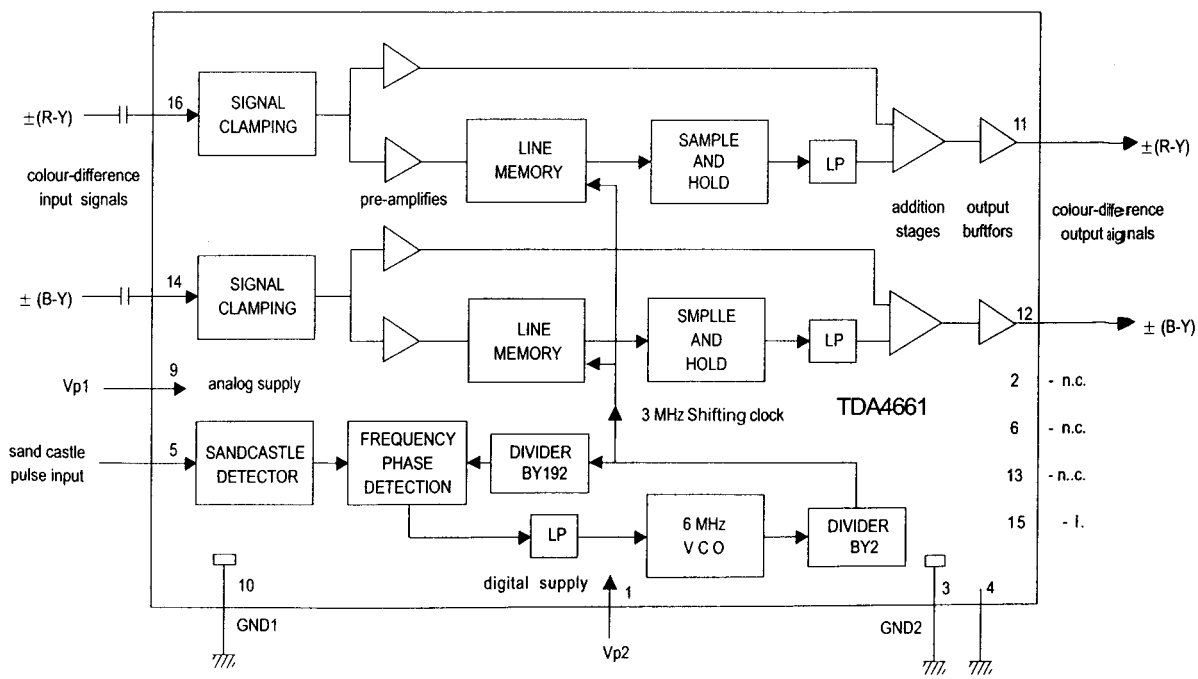
The TDA4661 are integrated the baseband delay lines of 64μS for colour television receivers. It can be connected to the TDA8362 and TDA8395 without the need of switches and alignments. The TDA4661 consists of two main blocks:

-Two comb filters with a delay time of 64μ sec in switched capacitor technique.

-Internal clock generation of 3MHz, line locked via the sandcastle pulse.

The TDA4661 operates according to the mode demanded by the colour transmission standard. In the PAL mode it operates as a geomentric adder to satisfy the requirements of PAL demodulation, in the NTSC mode it reduces the cross-colour interference (comb-filtering) and in the SECAM mode the delay line repeats the colour difference signal on consecutive horizontal scan lines.
The colour difference signals are AC-coupled to pin 14 and 16 and clamped by the input stages. The internal clock drives the delay lines to obtain the required 64μ sec. The clock pulses are derived from a 6MHz Current Controlled Oscillator which is the line locked via a PLL with the sandcastle pulse, connected at pin 5. Sample and hold low pass filters suppress the clock signal. The delayed and the un-delayed signals are added, buffered and fed to the output pins 11 and 12.

b)Block-Diagram

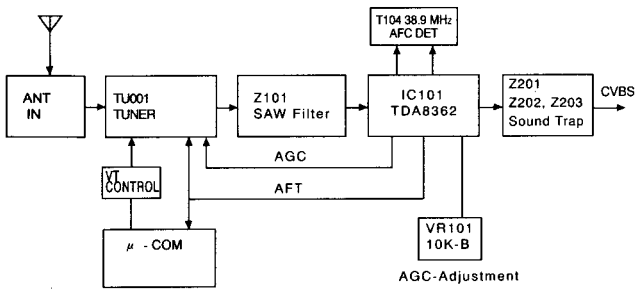


c)Pin Function

No	Symbol	Function	No		Function
1	Vp2	+8V Supply Voltage for analogue part	9	Vp1	+8V Supply Voltage for analogue part
2	n.c.	not connected	10	GND1	ground for analog part(0V)
3	GND2	ground for digital part(0V)	11	Vo(R-Y)	± (R-Y) output signal
4	i.c.	internally connected	12	Vo(B-Y)	± (B-Y) output signal
5	SAND	Sandcastle pulse input	13	n.c.	not connected
6	n.c.	not connected	14	Vi(B-Y)	± (B-Y) input signal
7	i.c.	internally connected	15	n.c.	not connected
8	i.c.	internally connected	16	Vi(R-Y)	± (R-Y) input signal

3.IF SECTION

1)Block-Diagram



2)Actuating Description

a)IF amplifier

The IF-amplifier contains 3 AC-coupled control stages with a total gain control range which is in excess of 60 dB. The sensitivity of the circuit is comparable with that of modern IF-IC's. The reference carrier for the video demodulator is obtained by means of the passive regeneration of the picture carrier. The external reference tuned circuit is the only remaining adjustment of the IC.
The polarity of the demodulator can be switched so that the circuit is suitable for both positive and negative modulated signals.

The AFC-circuit is driven with the same reference signal as the video demodulator. To avoid that the video content disturbes the AFC operation a sample-and-hold circuit is applied. The capacitor for this functions is internal. The AFC output voltage range is 6 Volts.

The AGC-detector operates on top-sync or top white-level depending on the position of the demodulator. The AGC detector time-constant capacitor is connected externally. This is mainly because of the flexibility of the application. The time-constant of the AGC system during positive modulation is rather longer to avoid visible variations of the signal amplitude. To obtain an acceptable speed of the AGC system a circuit has been included which detects whether the AGC detector is activated every frame period. When 3 frame periods no action is detected, the speed of the system is increased.

The circuit contains a video identification circuit which is independent of the synchronization circuit. Therefore the search tuning is possible when the display section of the receiver is used as a monitor. The ident output voltage is low when no transmitter is identified. In that condition the sound demodulator is switched off (mute function). When a transmitter is identified, the voltage is high. The voltage level is dependent on the frequency of the incoming chroma signal.

b)AGC Tuner AGC and AFC

The A.G.C. detector operates at top-sync level for signals with negative modulation and at peak-white level for positive modulated signals. This A.G.C. detector is gated for negative modulated signals to reduce the sensitivity of impulsive noise.

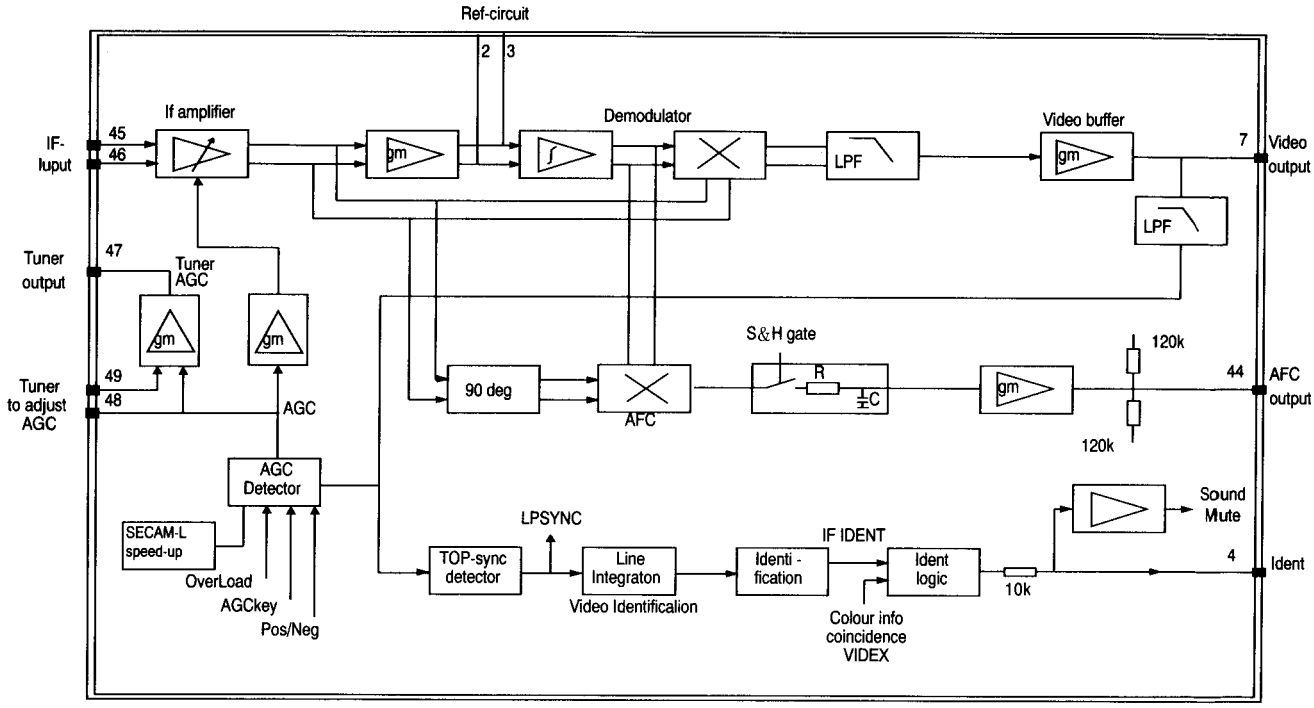
The time constant capacitor (C117) is connected externally at pin 48. For positive modulated signals the A.G.C. time constant is long to avoid visible variations of the video output signal. To obtain an acceptable A.G.C. speed with positive modulation an extra circuit checks whether the A. G.C. detector is activated every frame period. The speed will be increased if this circuit detects that the video output signal has not reached 80% of peak white level for approximately 100mS.
The tuner AGC take-over point can be set by adjusting the DC-voltage at pin 49, with a potentiometer of 10㏀ (VR101).

The tuner A.G.C. (pin 47) is an open collector output stage with an output swing of 2mA min. The voltage swing,required by the tuner, can be obtained with an external resistor network, connected at pin 47. Pin 47 may rise 2V above the actual supply voltage, without damaging the IC.

This feature simplifies the application, because most tuners require a 9V A.G.C. voltage level for min. gain.

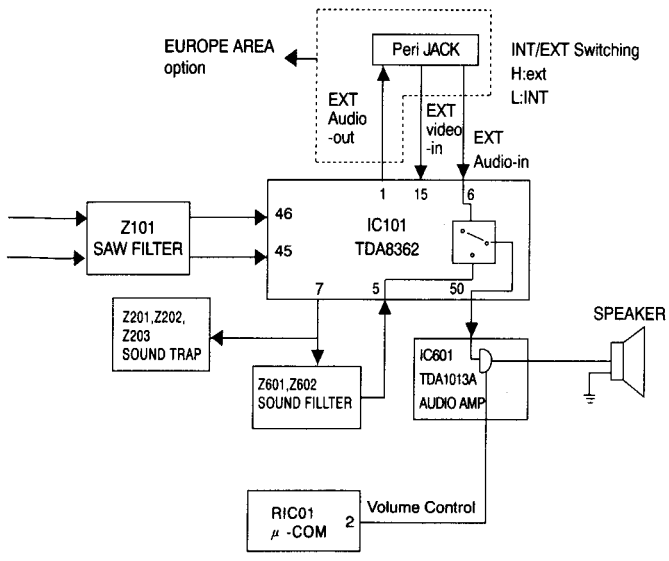
The A.F.C. circuit is driven by the same reference signal as the video demodulator.A sample and hold circuit avoids video break-through from the video demodulator to the A.F.C. voltage. The A.F.C. output voltage range is from 0 to Vcc, the stepness of the A.F.C. slope can be influenced by resistors R114 and R115.

3)IC Block-Diagram (TDA8362)



4.SOUND SECTION

1)Block-Diagram



2)Actuating Description

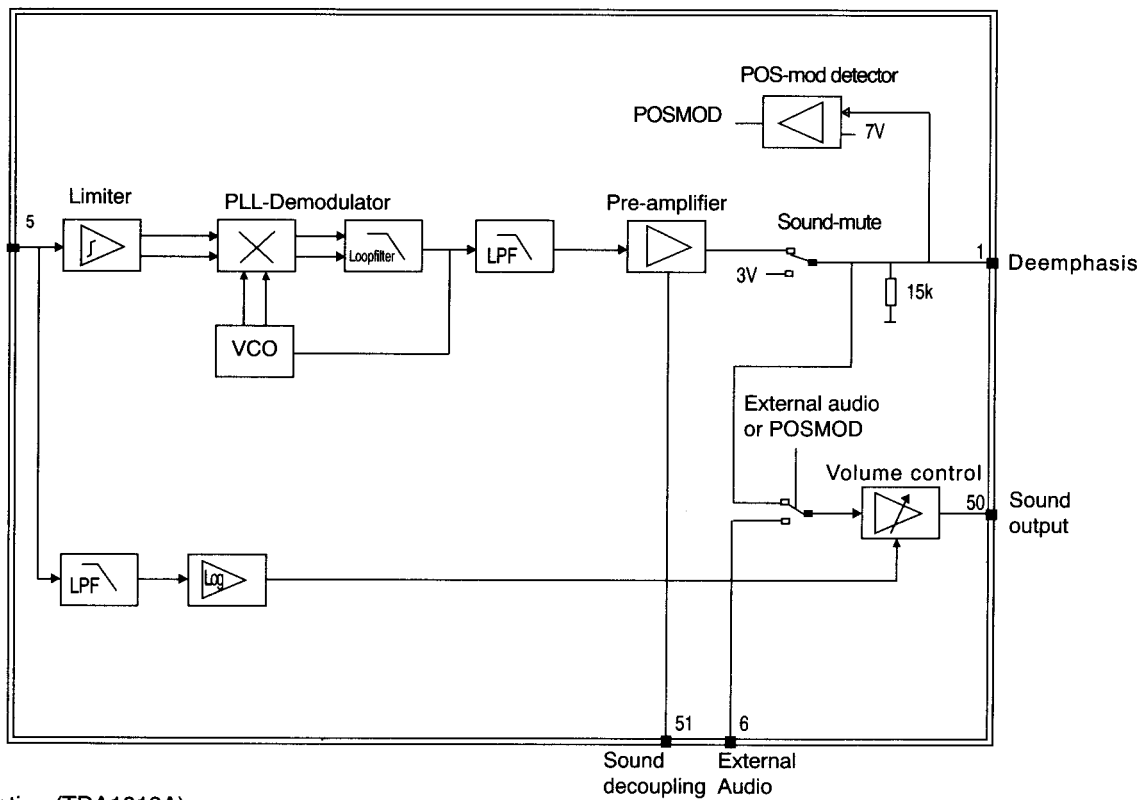
The sound bandpass and trap filters have to connected externally. For automatic system converting,the filtered inter carrier signal is fed to TA8710S (sound converter IC). The inputed sound signal is converted to 6.0MHz singnal. The converted sound signal is fed to alimilter circuit and is demodulated by means of a PLL demodulator. This PLL circuit itself tunes automatically to the incoming signal so that no adjustment is required, In case of NTSC, Sound signal is filtered to 4.5MHz BPF. The filtered intercarrier signal is fed to pin 5 of TDA8362.

The volume is the DC-controlled. The composite audio output signal has the amplitude of 700mV RMS at maximum volume control setting. The deemphasis capacitor has to be connected externally. The non-controlled audio signal can be obtained from this pin (via a buffer stage). The amplitude of this signal is 350mV RMS. The external audio input signal must have an amplitude of 350MV RMS. The audio/video switch is contoled via the chroma input pin(pin16).

Audio input signal from an external source (RCA JACK) with an amplitude up to 350mVrms (+/- 6 dB) can be fed to pin 6. The audio switch is controlled via the chroma input pin 16, as described in Chapter 2.1.8. The volume control operates upon the external audio input signal, when the TDA8362 is switched to the external mode.

When the TDA8362 is switched for video signals with the positive modulation, the demodulated AM-sound signal can be connected to the external audio input at pin 6 under the operation of the volume control.

3)IC Block-Diagram (TDA8362)



4) IC Specification (TDA1013A)

a)Introduction

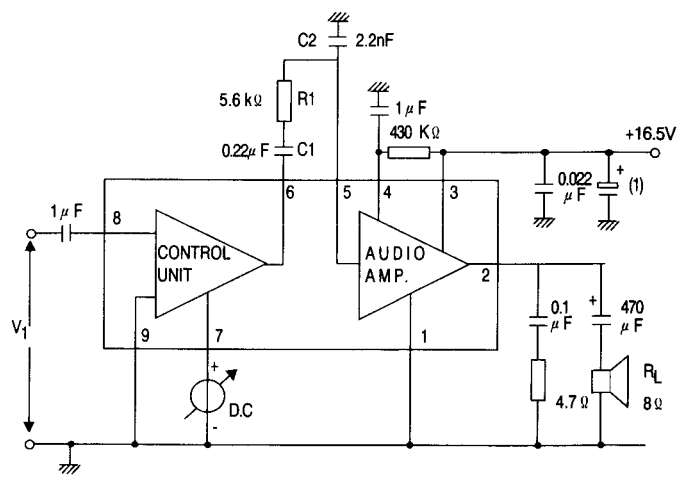
The TDA1013A is a monolithic integrated audio amplifier circuit with D.C. volume control in a 9-lead single in-line (SIL) plastic package. The wide supply voltage range makes this circuit very suitable for applications in mains fed apparatus such as television receivers and record players.

The D.C. volume control stage has a logarithmic control characteristic with a range of more than 80 dB; control can be obtained by means of a variable D.C. voltage between 3.5 and 8 V.

The audio amplifier has a well defined open loop gain and a fixed integrated closed loop gain. This offers an optimum in number of external components, performance and stability.

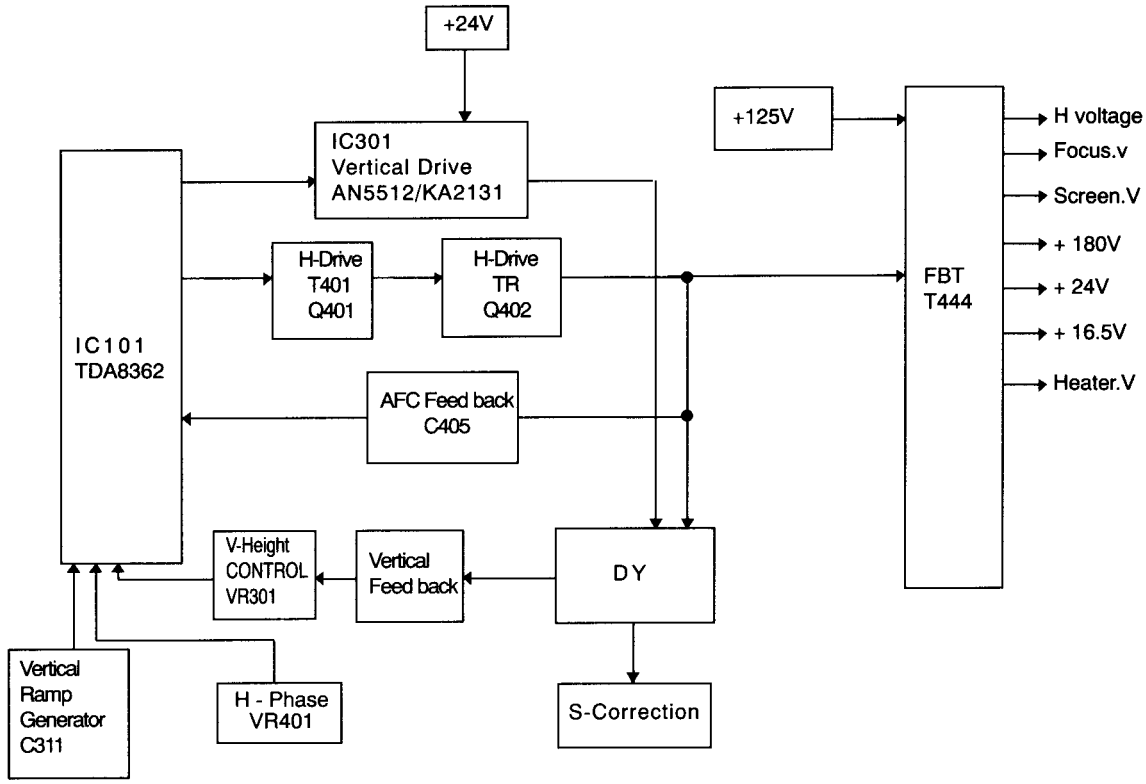
The SIL package (SOT-110B) offers a simple and low-cost heatsink connection.

b)Block-Diagram



5.DEFELECTION SECTION

1)Block-Diagram



2)Actuating Description

The incoming video signals, pin 13 for the internal signal and pin 15 for an external CVBS signal, are fed to the synchronization separator circuit. Internally the black level and the top sync. level are detected, next the synchronization pulses are amplified to a fixed level and sliced at 50% of that level. In this way a very good synchronization performance is obtained. The separated synchronization pulses are fed to the first phase detector circuit and to the coincidence detector. The components which determine the loop gain of the first phase detector are connected at pin 40 (C401, C402 and VR401). The coincidence detector is only used to detect whether the line oscillator is synchronised, not for transmitter identification.

The line oscillator is running at twice the line frequency and is derived from the X-tal oscillator frequency of the colour decoder, consequently no adjustment is required. The free-running frequency has a maximum deviation of 2% compared to the nominal frequency.

The second phase detector generates the pulses for the horizontal driver stage (pin 37).

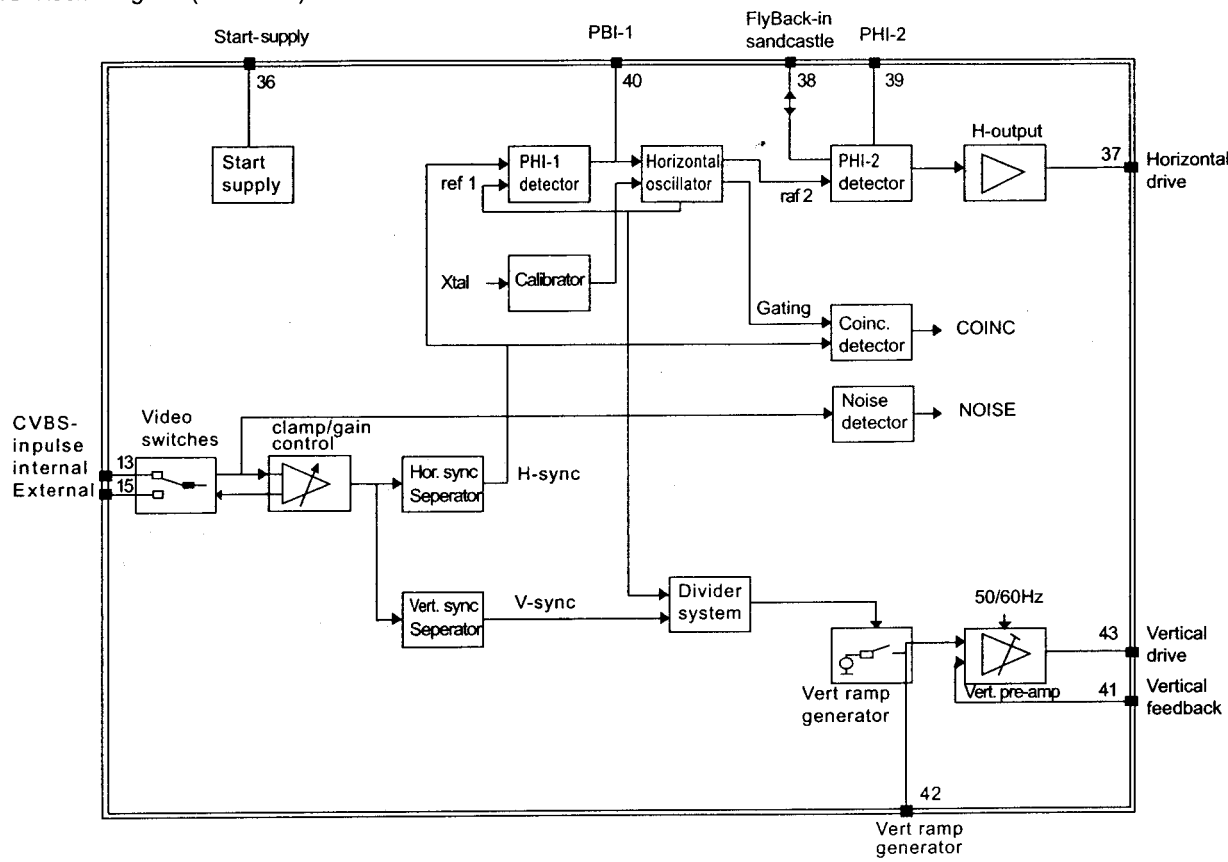
The loop filter capacitor (C404) is connected at pin 39. Horizontal shift can be obtained by a potentiometer and series resistor (R420 and VR401) connected at pin 39.

The TDA8362 has a separate start-up circuit for the horizontal oscillator (pin 36). In case this feature is used for starting the horizontal deflection the resistor connected at the base of the horizontal driver transistor (Q401) must be connected to the start supply as well (pin 37 is an open collector). For applications which do not require a start-up function pin 36 must be connected to the main supply voltage (8V).

The vertical drive pulses (pin 43) are generated by a divider circuit. The vertical ramp generator components are connected at pin 42. Capacitor C311 is charged via two resistors, one resistor connected to a stabilized supply voltage (R313). In this way the vertical amplitude will be kept constant with different picture contents.

AC and DC feedback voltage from the vertical deflection stage must be connected at pin 41.

3)IC Block-Diagram (TDA8362)



4)IC Specification (KA2131)

a)Introduction

The KA2131 is a monolithic integrated circuit designed for the vertical output stage in color television receivers.

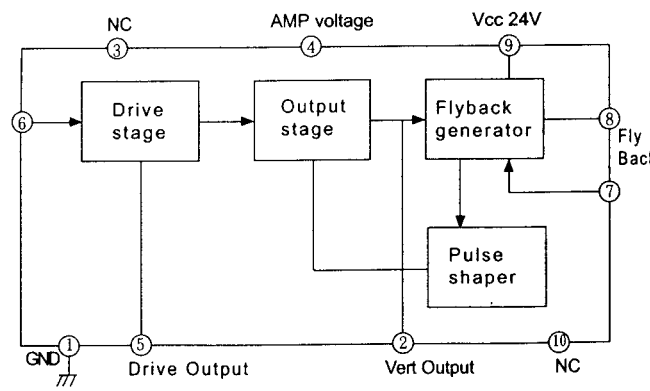
- FUNCTIONS

- Driver stage.
- Output stage.
- Flyback generator.
- Pulse shaper.

- FEATURES

- Low power consumption, direct deflection coil driving capability (Flyback voltage is supplied two times as high as supply voltage during flyback period only).
- High breakdown voltage : 60V

b)Block-Diagram



5.REMOCON SECTION

1.INTRODUCTION

CTV340S(SPM 109B) is a low cost television receiver control system bases on the PCA84C641 microcontroller. It is a voltage synthesis tuning (VST) system which can be used all over the world. All relevant control functions of the system are displayed via the on-screen display circuitry of the microcontroller. Herewith two independent lines of 16 characters with 4 different sizes and in 7 different colours can be displayed. All analogue picture settings are controlled with 4 on-chip digital to analogue convertors. The fifth digital to analogue converter can be used for volume in a mono-only option, or full sound (Voume, Bass, Treble, Balance) can be controlled in a German Stereo and/or Nicam sound configuration. This system is a colour standard independent.

A four page teletxt system, based on the IVT(SAA5246) and display memory, can be controlled indirectly via a second microcontroller. This offers the possibility of a sophisticated teletext system with special features like FASTEXT, TOP, LIST, packet X/26 decoding (for Spain and Easten Europe).A minimum amount of software is spent to transfer the teletxt commands fromthe remote control to this special teletext controller.A second option is a system with no teletext at all.

The CTV340S(SPM109B) system fulfils a numerous and varied requirements and has options to make it applicable to all markets.

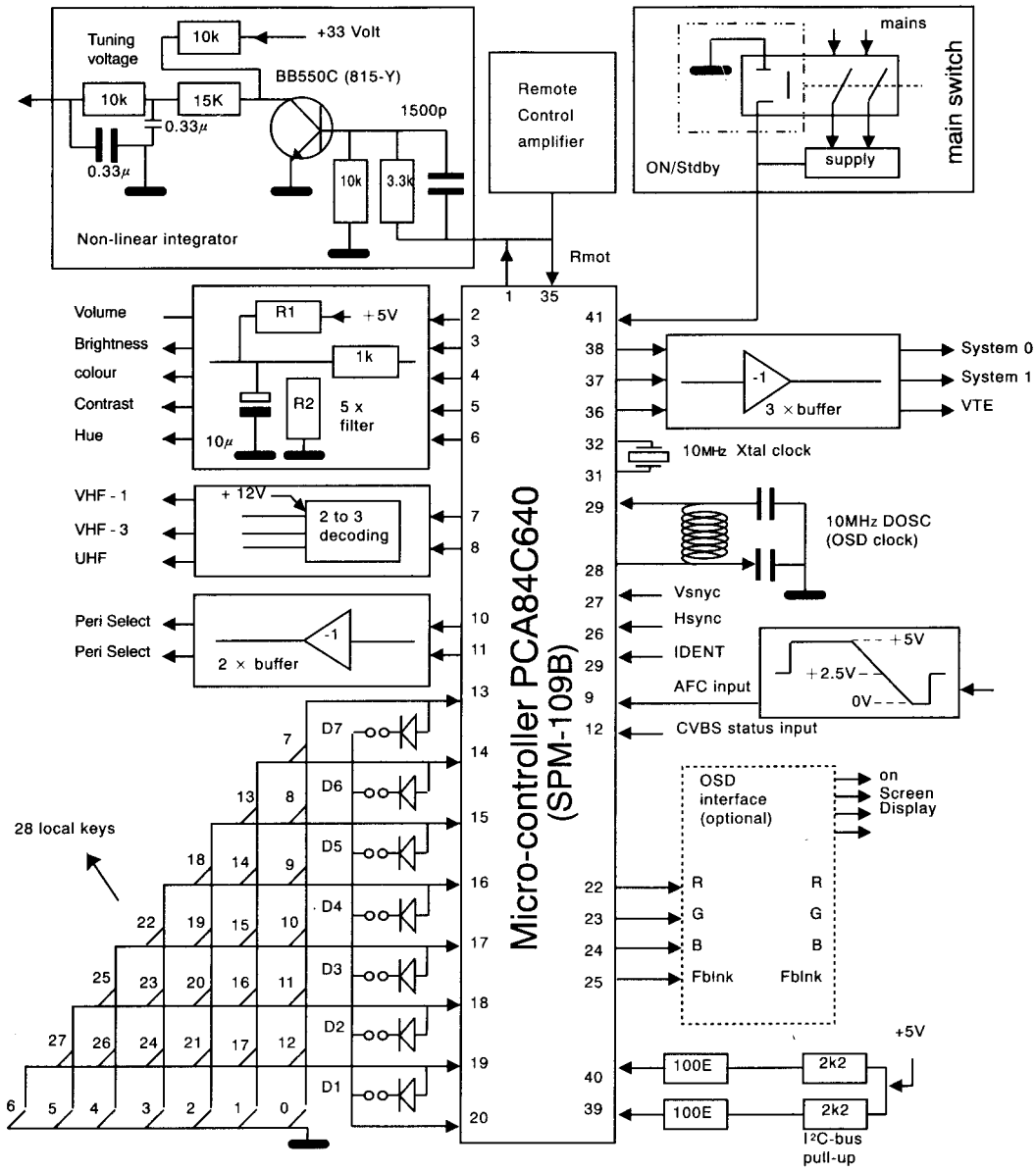
- Definitions, acronyms and abbreviations.

ACC	Analogue to Digital Convertor
Peri	Peripheral TV signal source
CCT	Computer Controlled Teletext decoder
DAC	Digital to Analogue Convertor
I^2C	Inter IC bus, 2-wire bidirectional multimaster bus
IDENT	horizontal coincidence signal, transmitter IDENTification
NV-memory	Non-Volatile memory
OSD	On Screen Display
PP	Personal Rreference, prefered analogue values
RC-5	Remote Control system, according RC-5 world standard
VST	Voltage Synthesis Tuning
VTR	Video Tape Recorder time constant
I VT	Integrated VIP and Teletext
VIP	Video Input Processor

MEMO

MEMO

2.BLOCK-DIAGRAM



3. PIN FUNCTION

No	Symbol	Function	No	Symbol	Function
1	VTUNN	tuning voltage control output	11	Peril	Peri output 1
2	VOL	volume control output in mono-only option	12	CVBS in	CVBS status input
3	BRI	brightness control output	13	KEYB0	keyboard scan line input/output
4	COL	colour control output	14	KEYB1	keyboard scan line input/output
5	CON	contrast control output	15	KEYB2	keyboard scan line input/output
6	HUE/	hue control output	16	KEYB3	keyboard scan line input/output
7	BND-0	band-switch output 0	17	KEYB4	keyboard scan line input/output
8	BND-1	band-switch output 1	18	KEYB5	keyboard scan line input/output
9	AFC	analogue AFC sense input	19	KEYB6	keyboard scan line input/output
10	Peri0	Peri output 0	20	MDSTR	system mode strobe output

No	Symbol	Function	No	Symbol	Function
21		ground supply input	32		oscillator output
22	RED	OSD red output	33		power-on reset input/output
23	GREEN	OSD green output	34	SND1	horizontal coincidence input
24	BLUE	OSD blue output	35	RMOT	remote control input
25	FBL	OSD fast blanking output	36	VTR	VTR time constant control output
26	HSYNC	horizontal synchronization input	37	Sys1	system output 1
27	VSYNC	vertical synchronizatin input	38	Sys0	system output 0
28	DOSCOUT	LC oscillator output for OSD	39	SCL	I²C - bus clock signal input/output
29	IDENT	LC oscillator input for OSD	40	SDA	I²C - bus data signal input/output
30		test input; connected to ground	41	STDBY	Standby/On control input/output
31		oscillator input; 10 MHz crystal	42		+5V supply voltage input

Notes:

1) These pins are read at "cold start", they define the configuration/options of the TV-system.

2) These pins can command a solenoid to switch-off AC-mains supply.

6.ALIGNMENT and ADJUSTMENT

- This Models has only one adjustment -

1.GENERAL INFORMATIONS

All the adjustments are thoroughly checked and corrected when the receiver leaves the factory. Therefore the receiver should operate normally and produce proper colour and B/W picture upon installation. However the minor service adjustments may be required depending on the particular location in which the receiver is operated. This receiver is shipped completely in carboard carton. Carefully draw out the carton and remove all the packing materials. Pulg the power cord into a convenient two pin power outlet. Turn the receiver ON and adjust the fine tuning for the best picture detail. Check and adjust all the customer controls such as BRIGHTNESS, CONTRAST and COLOUR Controls to obtain natural colour or B/W picture.

2.AUTOMATIC DEGAUSSING

A degaussing coil is mounted around the picture tube so that the external degaussing after moving the receiver is nomally unnecessary, providing the receiver is properly degaussed upon installation. The degaussing coil operates for about 1 second after the power to the receiver is switched ON. If the set is moved or faced in a different direction, the power switch must switch off at least 120 minutes in order that the automatic degaussing circuit is operated properly.

If the chassis or parts of the cabinet becomes magnetized and cause poor colour purity, use an external degaussing coil.

Slowly move the degaussing coil around the face-plate of the picture tube, the sides and the rear of the receiver and slowly withdraw the coil to the distance of about 2m before disconnecting it from the AC source. If the colour shading still persists, perform the COLOUR PURITY ADJUSTMENT and CONVERGENCE ADJUSTMENTS procedures, as mentioned later.

3.HIGH VOLTAGE CHECK

CAUTION : There is no HIGH VOLTAGE ADJUSTMENT on this chassis. But B+ power must be adjusted in +125V under the full colour bar pattern and nomal picture control level.

1)Connect an accurate high voltage meter to the second anode of the picture tube.

2)Turn on the receiver. Set the BRIGHTNESS and CONTRAST control to minimun(Zero beam).

3)The high voltage should be measured less.

4)Rotate the BRIGHNESS and CONTRAST control to the both extremes to be sure. The high voltage does not exceed the limit under any conditions.

4.HORIZONTAL PHASE ADJUSTMENT

If you want to move the center of picture, adjust HORIZONTAL phase control(VR401)

5.VERTICAL HEIGHT ADJUSTMENT

The SIZE control(VR301) on the main board changes the size of the picture, having an equal effect on the top and the bottom.

6.SCREEN ADJUSTMENT

1)Tune in an active channel.

2)Make the picture normal condition (no blooming or no-flyback line) with the VR screen.

7.FOCUS ADJUSTMENT

Adjust the FOCUS control on FBT for well defined scanning lines in the center area of the screen.

8.R-F AGC ADJUSTMENT

1)Tune the set in the strongest station in your area.

2)Turn the AGC control(VR101) on the IF board to fully clockwise position.

3)Adjust the AGC control until noises (snow) dissappear from the screen.

9.COLOUR PURITY ADJUSTMENT

NOTE : Before attempting any purity adjustments, the receiver should be operated for at least fifteen minutes. Purity adjustment requires Rubber Wedge kit.

1)Demagnetize the picture tube and cabinet using a degaussing coil.

2)Turn the CONTRAST and BRIGHTNESS controls to the maximum.

3)Receiver the green colour pattern.

4)Loosen the clamp screw holding the yoke, and slide the yoke backward or forward to provide the vertical green belt (zone) in the picture screen.

5)Remove the Rubber Wedges.

6)Rotate and spread the tabs of the purity magnet(See Fig.3) around the neck of the picture tube until a green belt is obtained in the center of the screen.
And at the same time, center the raster vertically by adjusting the magnet.

7)Move the yoke slowly forward or backward until a uniform red screen is obtained. Tighten the clamp screw.

8)Check the purity of the red and blue raster.

9)Tighten the clamp screw of the yoke temporarily.

10)Obtain a white raster ; referring to the "CRT WHITE BALANCE ADJUSTMENT ".

11)Proceed with convergence adjustment.

10.CRT WHITE BALANCE ADJUSTMENT

1) preparation

a)Operate the receiver for at least 20 minutes before attempting the white balance adjustment.

b)Receive a black and a white signals.
(Lion head pattern is better)

c)Set the colour control to the center position.

d)Set the brightness and contrast controls to the maximum position.

e)Set the red, blue and green low light controls to the mechanical center position.

f)Set the blue and red drive controls to the mechanical center position.

g)Set the screen VR control on FBT to the minimum position (fully counter - clockwise).

h)Connect 1 to 2 and 3 to 4 in CN402.

2)STEPS

a)Rotate the SCREEN control on FBT (T444) gradually clockwise until the first horizontal line appears slightly on the screen.

b)Adjust the two CUT - OFF controls to obtain the slightly lighted horizontal line in the same levels of three colours(red, green,blue).
The line look like white if the CUT - OFF controls are adjusted properly.

c)Reset the CN402 on the MAIN board to obtain a raster ("NORMAL" Position).

d)Adjust the blue and red drive controls to obtain proper white - balanced picture in high light areas.

e)Set the contrast control to the minimum position and turn the brightness control slightly counterclockwise to obtain a dark gray raster.
Then check the white balance in low brightness.
If the white balance is not enough, repeat steps 1) - 4) for the correct white balance.

11.CONVERGENCE ADJUSTMENTS

NOTE : Before attempting any convergence adjustment, the receiver should be operated for the least fifteen minutes.

1)Center Convergence Adjustment

a)Receive the crosshatch pattern with a colour bar signal generator.

b)Adjust the BRIGHTNESS and CONTRAST Controls for a well defined pattern.

c)Adjust the two tabs of the 4-pole Magnets to change the angle among them (See Fig.2) and superimpose the red and the blue vertical lines in the center area of the picture screen. (See Fig.2).

d)Turn the both taps while at the same time keeping angle constant and superimpose the red and the blue horizontal lines at the center of the screen. (See Fig. 3).

e)Adjust the two tabs of 6-pole Mangnets to superimpose the red/blue line and green one.
Adjust the angle to affect the vertical lines and

rotate both magnets to affect the horizontal lines.

f)Due to the interaction between these adjustments the steps 3,4 and 5 should be repeated until the satisfactory results are obtained.

2)Circumference Convergence Adjustment

a)Loosen the clamping screw of deflection yoke to allow the yoke to tilt.

b)Put a wedge as shown in Fig. 1 temporarily. (Do not remove the cover paper on adhesive part of the wedge).

c)Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See Fig.3) Push the mounted wedge into the space between the picture tube and the yoke to fix the yoke temporarily.

d)Put the other wedge into bottom space and remove the cover paper to stick.

e)Tilt the front of the yoke right of lift to obtain the convergence in circumference. (See Fig.3)

f)Keep the yoke position and put another wedge in either upper space. Remove the cover paper and stick the wedge on picture tube to fix the yoke.

g)Detach the temporarily mounted wedge and put in another upper space. Stick it an picture tube to fix the yoke

h)After fixing three wedges recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.

i)Stick 3 adhesive tabs on wedges as shown in Fig. 1.

12.AFT ADJUSTMENT

1)Equipment

-Pattern generator (PM5518)

- Digital Voltmeter

2)Preparation

a)Set the supply voltage to AC 220V

b)Set the RF output frequency of Gen to 38.9MHz and then Multi-burst pattern.

c)Connect the RF out of PM5518 to Tuner's Pin (IF)

d)Connect the DC volts-meter to J153

e)Adjust the DC voltage of J153 tape 4V by controlling the T104.

MEMO

MEMO

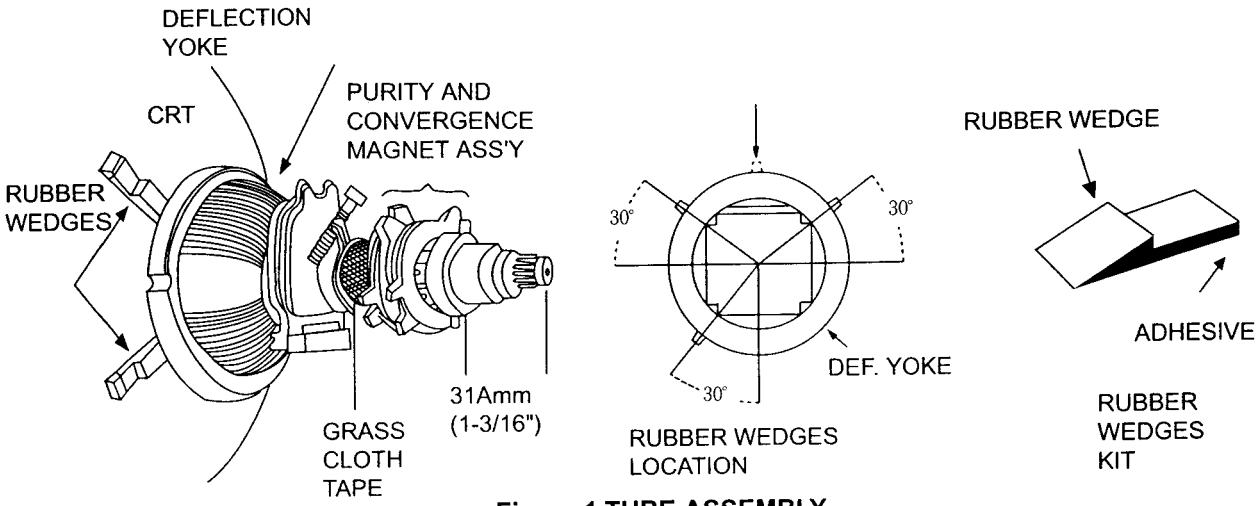


Figure 1.TUBE ASSEMBLY

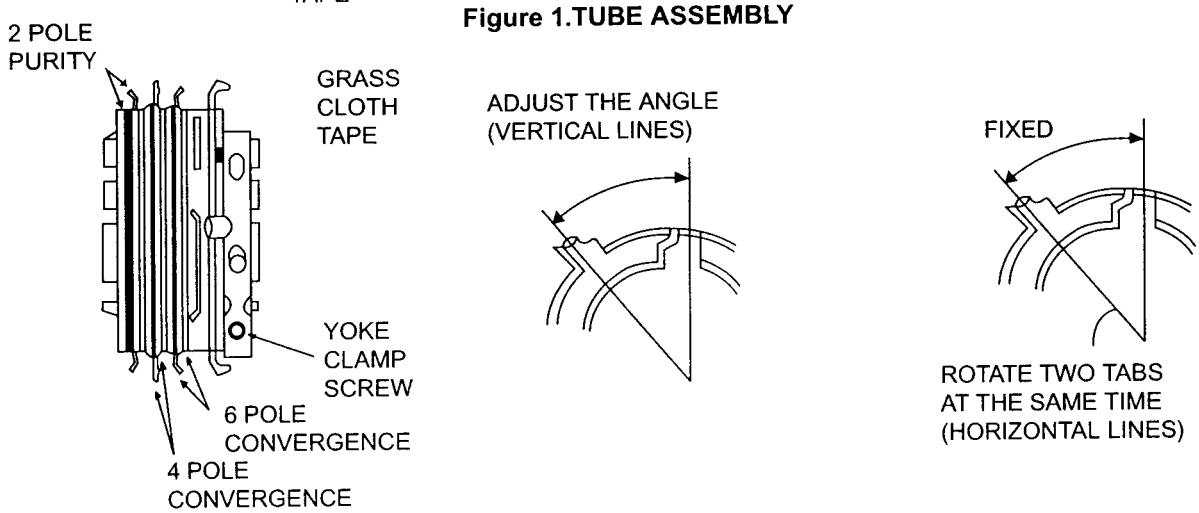
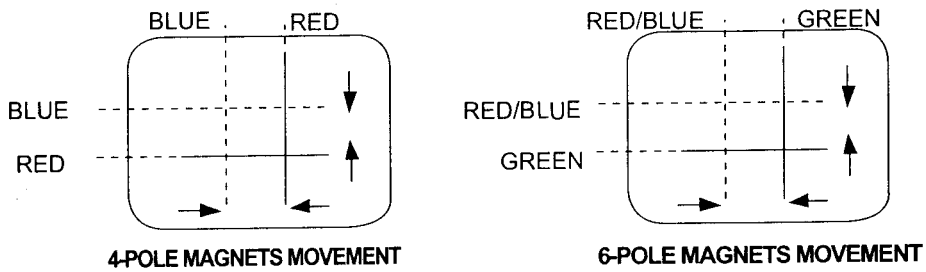
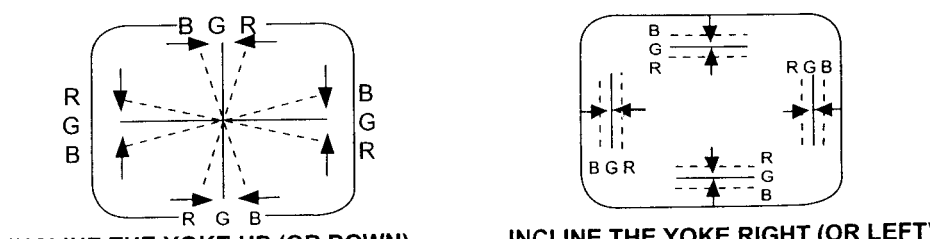


Figure 2. PURITY AND CONVERGENCE MAGNETS



4-POLE MAGNETS MOVEMENT **6-POLE MAGNETS MOVEMENT**

Center Convergence by Magnets



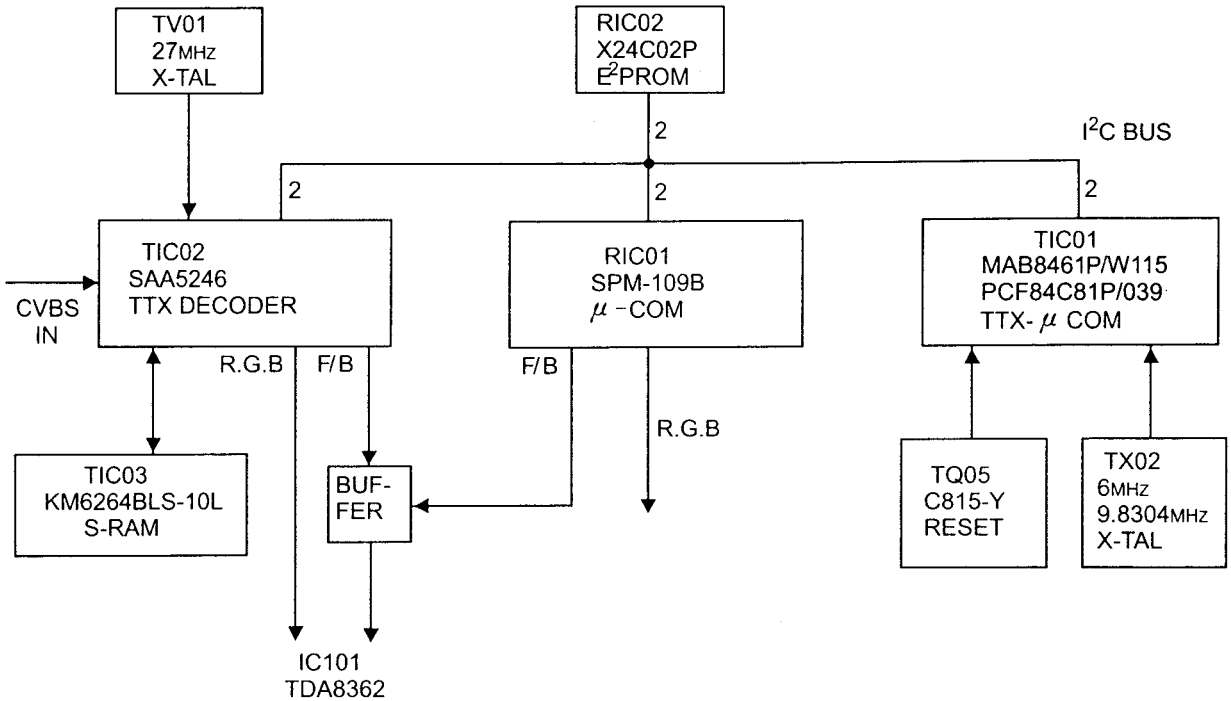
INCLINE THE YOKE UP (OR DOWN) **INCLINE THE YOKE RIGHT (OR LEFT)**

Circumference Convergence by DEF. Yoke

Figure 3. Dot Movement Pattern

7.TELETEXT SECTION (option)

1. TTX BLOCK DIAGRAM(OPTION)



2. SEMICONDUCTOR SPECIFICATION

a. DESCRIPTION

The MAB8401 family of microcontrollers is fabricated in NMOS. The family consists of 5 devices:

- MAB8401 - 128 bytes RAM, external program memory, with 8-bit LED-driver(10mA), emulation of MAB/F8422/42 * possible
- MAB/MAF8411 - 1K byts ROM/64 bytes RAM plus 8-bit LED-driver
- MAB/MAF8421- 2K byts ROM/64 bytes RAM plus 8-bit LED-driver
- MAB/MAF8441- 4K byts ROM/128 bytes RAM plus 8-bit LED-driver
- MAB/MAF8461- 6K byts ROM/128 bytes RAM plus 8-bit LED-driver

Each version has 20 quasi-bidirectional I/O port lines, one serial I/O line, one single-level vectored interrupt, an 8-bit timer/event counter and on-board clock oscillator and clock circuits. Two 20-pin versions, MAB/F8422 and MAB/F8442 * are also available.

This microcontroller family is designed to be an efficient controller as well as an arithmetic processor.The instruction set is based on that of the MAB8048. The microcontrollers have extensive bit handling abilities and facilities for both binary and BCD arithmetic.

For detailed information see the "8-bit single-chip microcontrollers user manual".

b. FEATURES

- 8-bit: CPU,ROM,RAM and I/O in a single 28-lead DIL package
- 1K,2K,4K, or 6K, ROM bytes plus a ROM-less version
- 64 or 128 RAM bytes
- 20 quasi-bidirectional I/O port lines
- Two testable inputs: one of which can be used to detect zero cross-over, the other is also the external interrupt input
- Single level vectored interrupts: external, timer/event counter, serial I/O
- Serial I/O that can be used in single or multi-master systems(serial I/O data via an existing port line and clock via a dedicated line)
- 8-bit programmable timer/event counter
- Internal oscillator, generated with inductor, crystal, ceramic resonator or external source
- Over 80 instructions (based on MAB8048) all of 1 or 2 cycles
- Single 5 V power supply (± 10%)
- Operating temperature ranges:

0 to + 70℃	MAB84	× 1 family
-40 to + 85℃	MAF84	× 1 family only
-40 to + 110℃	MAF84A	× 1 family only

C. PIN FUNCTION

Pin	Name	0	Function
1	P22	2	Not used
2	SDA	1	Serial data I^2C-bus
3	SCL		Serial clock I^2C-bus
4	P00	2	Link - select I^2C/MIBUS control
5	P01	2	Power Down Imminent input
6	P02	3	PL output
7	P03	3	PON output
8	P04	3	PROC data output
9	P05	3	PROC clock output
10	P06	2	MIBUS data input
11	P07	3	DATA inhibit output
12	INT/TO	2	MIBUS DLEN, NAND, DLIM
13	T1		PL signal input
14	Vss		0V
15	XTAL 1		Crystal oscillator connection (frequency =6MHz±500Hz)
16	XTAL 2		
17	RESET		Reset circuit
18	P10	2	Link - select FASTEXT/LIST mode at power-up
19	P11	2	Link - ENGLISH/EUROPEAN MIBUS & screen symbols
20	P12	2	Link - 2K8/8K8 static page RAM connected
21	P13	2	Link - enable use of NVRAM
22	P14	2	Link - enable PACKET $8/_{30}$ identification display
23	p15	2	Link - enable on-screen PROGRAM prompts
24	p16	2	Link - enable LVB controlled keys/status row
25	p17	2	Link - enable STATUS ROW used in NON-FASTEXT
26	p20	2	Link - select $128/_{256}$ byte NVRAM
27	p21	2	Not used
28	Vcc		5V(main) supply

★ MAB8461P/W115 option (TTX)

Pin	0	Pin LOW	Pin HIGH
4	2	MIBUS command input	I^2C command input
18	2	LIST mode at power-up	FASTEXT mode at power-up
19	2	European MIBUS & symbols	English MIBUS & symbols
20	2	2K8 static RAM connected	8K8 static RAM connected
21	2	No NVRAM connected	Enable use of NVRAM
22	2	Disable $8/_{30}$ display	Enable $8/_{30}$ display
23	2	Disable on-screen prompts	Enable on-screen prompts
24	2	Disable LCB decoding	Enable LCB decoding
25	2	Disable row 24 if no $X/_{27}$	Enable row 24 if no $X/_{27}$
26	2	256×8 NVRAM connected	258×8 NVRAM connected

PCF84C81/039 TTX-μ-Com

a.DESCRIPTION

An advanced CMOS process is used to manufacture the PCF84CXX family of microcontrollers. The family consists of the following devices:

- PCF84C00 - 256×8 RAM, external program memory
- PCF84C21 - 2 K×8 ROM, 64×8 RAM
- PCF84C41 - 4 K×8 ROM, 128×8 RAM
- PCF84C81 - 8 K×8 ROM, 256×8 RAM

Each version has 20 quasi-bidirectional I/O port lines, a serial I/O interface, a single-level vectored interrupt structure, an 8-bit timer/event counter and on-chip clock oscillator and clock circuits.

Each member of this microcontroller family is an efficient controller as well as an arithmetic processor. The instruction set is similar to that of the MAB8048 and the

PCF84CXX family is pin-and instruction set compatible with the MAB8400 family. The microcontrollers have facilities for both binary and BCD arithmetic plus bit-handling capabilities. For detailed information see the user manual "Single-chip 8-bit microcontrollers".

b.FEATURES

- 8-bit CPU, ROM, RAM, I/O in a single 28-lead DIL or SO package
- 2K, 4K or 8K × 8 ROM; also a ROM-less version
- 64, 128 or 256 × 8 RAM
- 20 quasi-bidirectional I/O port lines
- Two test inputs: one of which is also the external interrupt input
- Single-level vectored interrupts: external, timer/event counter, serial I/O
- I^2C hardware interface for serial data transfer on two lines (serial I/O data via an existing port line and clock via a dedicated line)
- 8-bit programmable timer/event counter
- Clock frequency range: 100 KHz to 10 MHz
- Over 80 instructions (similar to those of the MAB8048) all of 1 or 2 cycles
- Single supply voltage (2.5V to 5.5V)
- STOP and IDLE modes
- Power-on-reset circuit
- Operating temperature range: −40 to + 85℃
- High current output on port 1: I_{OL}=10 mA at V_{OL} =1.2V(all versions except the PCF84C00)

c.PIN FUNCTION

Pin	Name	0	Function
1	P22	1	Link-Western/Eastern Europe
2	SDA		Serial data I^2C-bus
3	SCL		Serial clock I^2C-bus
4	P00	1	Link - select I^2C/MIBUS control
5	P01	1	Power Down Imminent input
6	P02	1	PL output
7	P03	1	PON output
8	P04	1	PROC data output
9	P05	1	PROC clock input
10	P06	1	MIBUS data input
11	P07	1	DATA inhibit output
12	INT/TO		MIBUS DLEN, NAND, DLIM
13	T1		PL signal input
14	Vss		0C
15	XTAL 1		Crystal oscillator connection(frequency =9.830 MHz±0.7%)
16	XTAL 2		
17	RESET		Reset circuit
18	P10	1	Link - select FASTEXT/LIST mode at power-up
19	P11	1	Link - ENGLISH/EUROPEAN MIBUS & screen symbols
20	P12	1	Link - 2K8/8K8 static page RAM connected
21	P13	1	Link - enable use of NVRAM
22	P14	1	Link - enable PACKET $8/_{30}$ identification display
23	p15	1	Link - enable on-screen PROGRAM prompts
24	p16	1	Link - enable LCB controlled keys/status row
25	p17	1	Link - enable STATUS ROW used in NON-FASTEXT
26	p20	1	Link - select $128/_{256}$ byte NVRAM
27	p21	1	Link - enable display of row 24
28	Vcc	1	5V(main) supply

★ PCF84C81/039 option (TTX)

Pin	0	Pin LOW	Pin HIGH
1	1	E. Europe ECCT SAA5246 P/H	W. Europe ECCT SAA5246 P/E
4	1	MIBUS command input	I²C command input
18	1	LIST mode at power-up	FASTEXT mode at power-up
19	1	European MIBUS & symbols	English MIBUS & symbols
20	1	2K8 static RAM connected	8K8 static RAM connected
21	1	No NVRAM connected	Enable use of NVRAM
22	1	Disable $8/_{30}$ display	Enable $8/_{30}$ display
23	1	Disable on-screen prompts	Enable on-screen prompts
24	1	Disable LCB decoding	Enable LCB decoding
25	1	Disable row 24 if no $X/_{27}$	Enable row 24 if no $X/_{27}$
26	1	256×8 NVRAM connected	128×8 NVRAM connected
27	1	Disable display of row 24	Enable display of row 24

a.TYPICAL FEATURES

- Low Power CMOS
  - Active Current Less Than 1 mA
  - Standby Current Less Than 50 μA
- internally Organized 256×8
- Self Timed Write Cycle
  - Typical Write Cycle Time of 5 ms
- 2 Wire Serial Interface
  - Bidirectional Data Transfer Protocol
- Four Byte Page Write Operation
  - Minimizes Total Write Time Per Byte
- High Reliability
  - Endurance: 100,000 Cycles Per Byte
  - Data Retention: 100 Years
- New hardwire-Write Control Function

b.DESCRIPTION

The X24C02 is a 2048 bit serial E²PROM, internally organized as one 256×8 page. The X24C02 features a serial interface and software protocol allowing operation on a simple two wire bus.

Xicor E²PROMs are designed and tested for applications requiring extended endurance. Inherent data retention is greater than 100 years. Refer to RR-515 for details of data retention characteristics, and RR-520 for endurance cycling information for Xicor nonvolatile memories.

c.ABSOLUTE MAXIMUM RATINGS *

Temperature Under Bias
X24C02 ..... −10℃to +85℃
X24C02I ..... −65℃ to +135℃
Storage Temperature ..... −65℃ to +150℃
Voltage on any Pin with
Respect to V_{SS} ..... −1.0V to +7V
D.C. Output Current ..... 5 mA
Lead Temperature
(Soldering, 10 Seconds) ..... 300℃

d.D.C. OPERATING CHARACTERISTICS

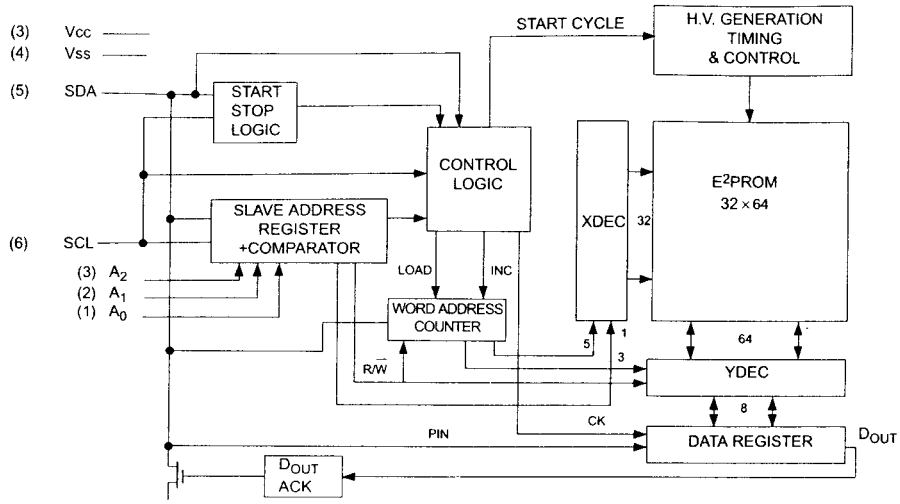
X24C02 T_A = 0℃ to +70℃, V_{CC} = 5V ± 10%, unless, otherwise specified.

X24C02I T_A = −40℃ to +85℃, V_{CC} = 5V ± 10%, unless, otherwise specified.

V_{CC} range for the X24C02 and X24C021 are defined in the Ordering information table.

Symbol	Parameter	Min.	Max.	Units	Test Conditions
I_{CC}	Power Supply Current		1	mA	SCL = CMOS Levels @ 100 KHz, SDA = Open, all Other Inputs = GND or V_{CC} − 0.3V
I_{SB}(1)	Standby Current		50	μA	SCL = SDA = V_{IH} All Other Inputs = V_{IL} or V_{IH}
I_{LI}	Input Leakage Current		10	μA	V_{IN} = GND to V_{CC}
I_{LO}	Output Leakage Current		10	μA	V_{OUT} = GND to V_{CC}
V_{IL}(2)	Input Low Voltage	−1.0	V_{CC}×0.3	V	
V_{IH}(2)	Input High Voltage	V_{CC}×0.7	V_{CC}+ 0.5	V	
V_{OL}	Output Low Voltage		0.4	V	I_{OL}=3 mA

e.FUNCTIONAL DIAGRAM



KM6264 BCS-10L:S-RAM(MEMORY)

a.GENERAL DESCRIPTION

The KM6264B/BL/BL-L is a 65,536-bit high-speed Static Random Access Memory orgranized as 8,192 words by 8 bit. The device is fabricated using Samsung's advanced CMOS process. The KM6264B/BL/BL-L has an output enable input for precise control of the data outputs. It also has chip select inputs for the minimum current power down mode. The KM6264B/BL/BL-L has been designed for high speed and low power applications. It is particularly well suited for battery back-up non-volatile memory applications.

b.FEATURES

- Fast Access Time: 70,100,120, ns (max.)
- Low Power Dissipation

  Standby (CMOS): 10μW (typ.) L-Version

  5μW (typ.) LL-Version

  Operating: 55mW/MHz (max.)
- Single 5V$\pm$10% Power Supply
- TTL compatible inputs and outputs
- Fully Static Operation
  - No clock or refresh required
- Three State Output
- Low Data Retention Voltage: 2V (min.)
- JEDEC Standard pin Configuration

  KM6264B/BL/BL-L: 28-pin DIP (600 mil)

  KM6264BS/BLS/BLS-L: 28-pin DIP (300 mil)

  KM6264BG/BLG/BLG-L: 28-pin SOP (330 mil)

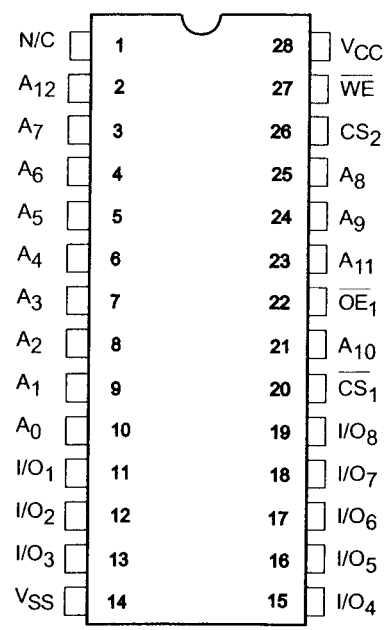
c.PIN CONFIGURATION AND NAMES

A_0-A_{12}	Address inputs
$\overline{WE}$	Write enable
$\overline{CS1}$,CS2	Chip select
$\overline{OE}$	Output enable
I/O_1-I/O_8	Data input/Output
Vcc	+5V power supply
Vss	Ground

d.Recommanded operating conditions (ta=0℃ to 70℃)

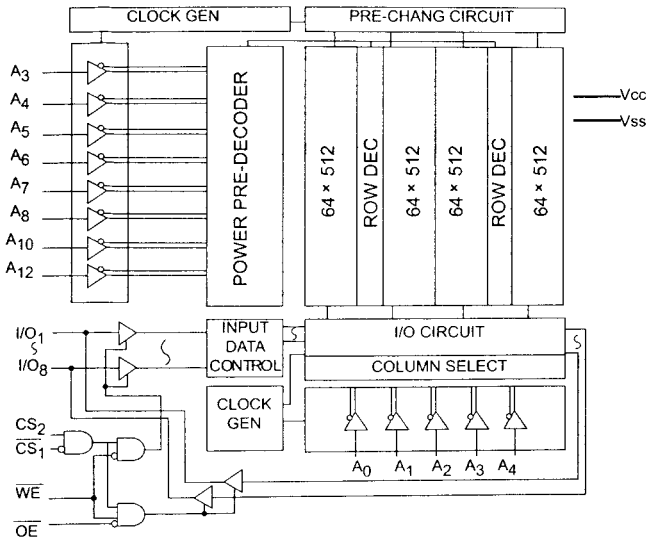
* Note: VIL(min)=-3.0V for $\leq$ 50ns pulse.

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Vcc	4.5	5.0	5.5	V
Ground	Vss	0	0	0	V
Input high voltage	VIH	2.2	—	Vcc+0.3	V
Input low voltage	VIL	-0.3	—	0.8	V



Pin configuration

e.FUNCTIONAL BLOCK DIAGRAM



INTEGRATED VIP AND TELETEXT(IVT)

a.GENERAL DESCRIPTION

The integrated VIP and Teletext(IVT) is a teletext decoder (contained within a single chip package) for decoding 625-line based World System Teletext tramsmissions. The teletext decoder hardware is based on the Enhanced Computer Controlled Teletext (ECCT) device (SAA5243) with some additional features; existing ECCT software remains compatible. The Video Input Processor (VIP) section of the device uses new mixed analogue and digital designs for the Data Slicer and the Display Clock Phase Locked Loop functions. As a result the number of external components is greatly reduced and no critical or adjustable components are required.

Features

- Complete teletext decoder in single 48-pin DIL package
- Single +5V power supply
- Digital Data Slicer and Display Clock Phase Locked Loop reduce peripheral components to a minimum
- Both video and scan related synchronization modes are supported
- 4/8 page acquisition system is software compatible with ECCT
- RGB interface to standard color decoder ICs, push pull output drive; requires only 2 external resistors
- Data capture performance comparable with SAA5231 (VIP2)
- Software compatibility with ECCT maintained
- Interfaces with 8K × 8-bit static RAM
- Optional storage of packet 24 in the display memory
- Packet 8/30/2 mapped to a different extension chapter as an aid for VCR programming applications

b.QUICK REFERENCE DATA

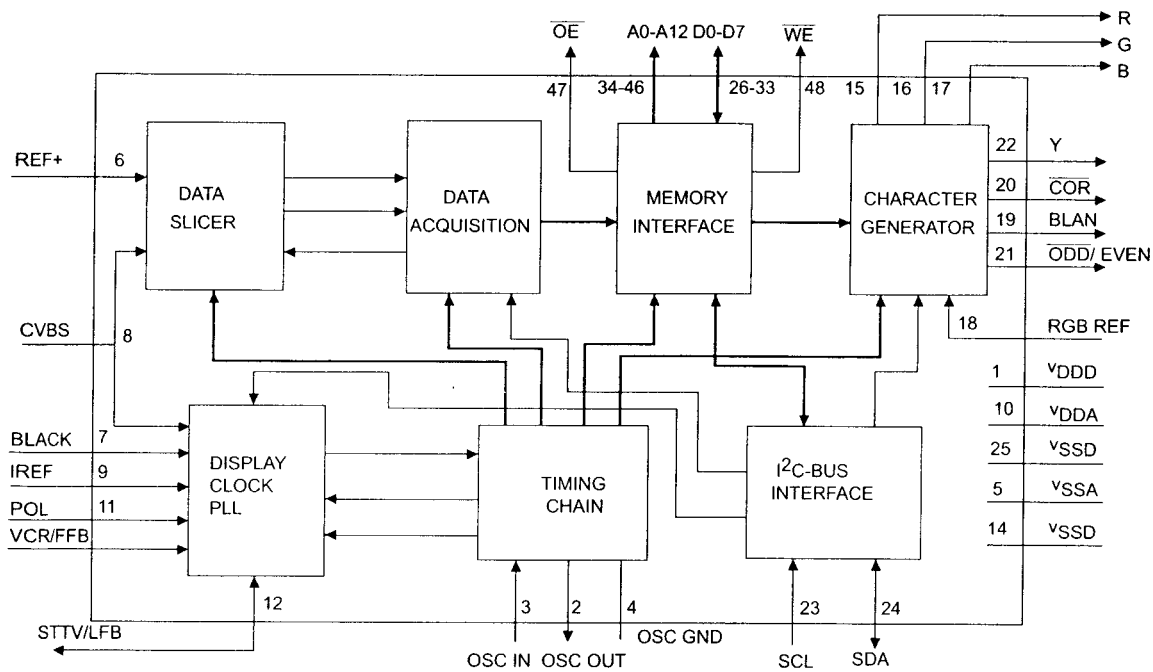
Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{DD}	4.5	5	5.5	V
Supply current	I_{DD}	—	60	120	mA
Sync amplitude	Vsyn	0.1	0.3	0.6	V
Video amplitude	Vvid	0.7	1	1.4	V
Crystal frequency	fXTAL	—	27	—	MHz
Operating ambient temperature range	Tamb	−20	—	+70	℃

c.PINNING DESCRIPTION

Pin	Name	Description
1	VDDD	+5V supply to the digital sections of the device.
2	OSCOUT	27MHz crystal oscillator output.
3	OSCIN	27MHz crystal oscillator input.
4	OSCGND	Crystal oscillator ground, 0V.
5	VSSA	Analogue ground, 0V.
6	REF+	Positive reference voltage for the ADC. If necessary, the pin should be connected to analogue +5Vvia decoupling components.
7	BLANK	Video black level storage pin, connected to analogud ground via a 100nFcapacitor.
8	CVBS	Composite video input pin. A positive-going 1V peak-to-peak input is required, connected via a 100nF capacitor.
9	Iref	Reference current input pin, connected to analogue ground via a 27kΩ resistor.
10	VDDA	+5V supply to the analogue sections of the device.
11	POL	STTV/LFB/FFB polarity select pin.
12	STTV/LFB	Sync to TV output pin/line flyback input pin, function controlled by an internal register bit.
13	$\overline{VCR}$/FFB	PLL time constant switch/field flyback input pin, function control by an internal register bit.
14	VSSD	Connected to VSSD for normal operation.
15	R	Dot rate character output of the RED colour information.
16	G	Dot rate character output of the GREEN colour information.
17	B	Dot rate character output of the BLUE colour information.
18	RGBREF	DC voltage to define the output high level on the RGB pins.
19	BLAN	Dot rate fast blanking output. HIGH for text and LOW for picture.

Pin	Name	Description
20	$\overline{COR}$	Programmable output to provide contrast reduction of the TV picture for mixed text and picture displays or when viewing newsflash/subtitle pages.
21	$\overline{ODD/EVEN}$	25Hz output synchronized with the CVBS input's field sync pulses to produce a noninterlaced display by adjustment of the vertical deflection currents.
22	Y	Dot rate character output of teletext foreground colour information. Open drain output.
23	SCL	Serial clock input for I^2C-bus. It can still be driven HIGH during power-down of the device.
24	SDA	Serial data port for the I^2C-bus. Open drain output. It can still be driven HIGH during power-down of the device.
25	VSSD	Digital ground, 0V.
26-33	D0-D7	Data lines for the page RAM.
34-46	A0-A12	Address lines for the page RAM.
47	$\overline{OE}$	Output enable to the page RAM.
48	$\overline{WE}$	Write enable to the page RAM.

d. IVT BLOCK DIAGRAM

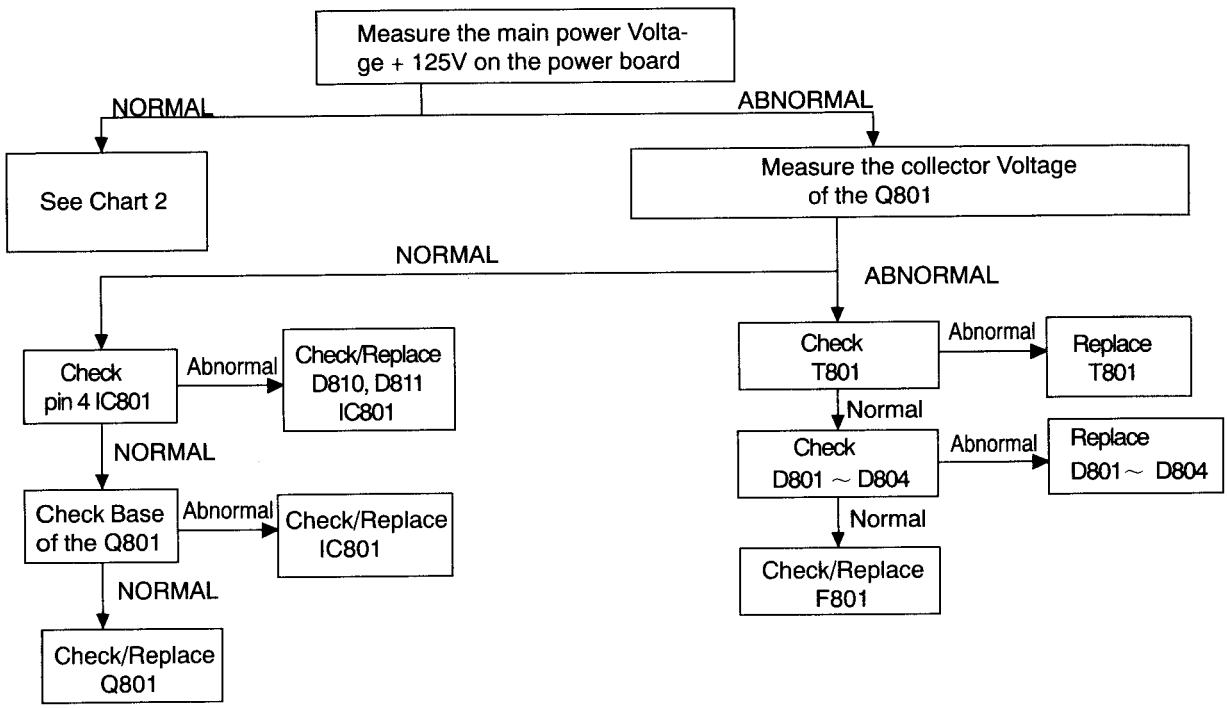


MEMO .....

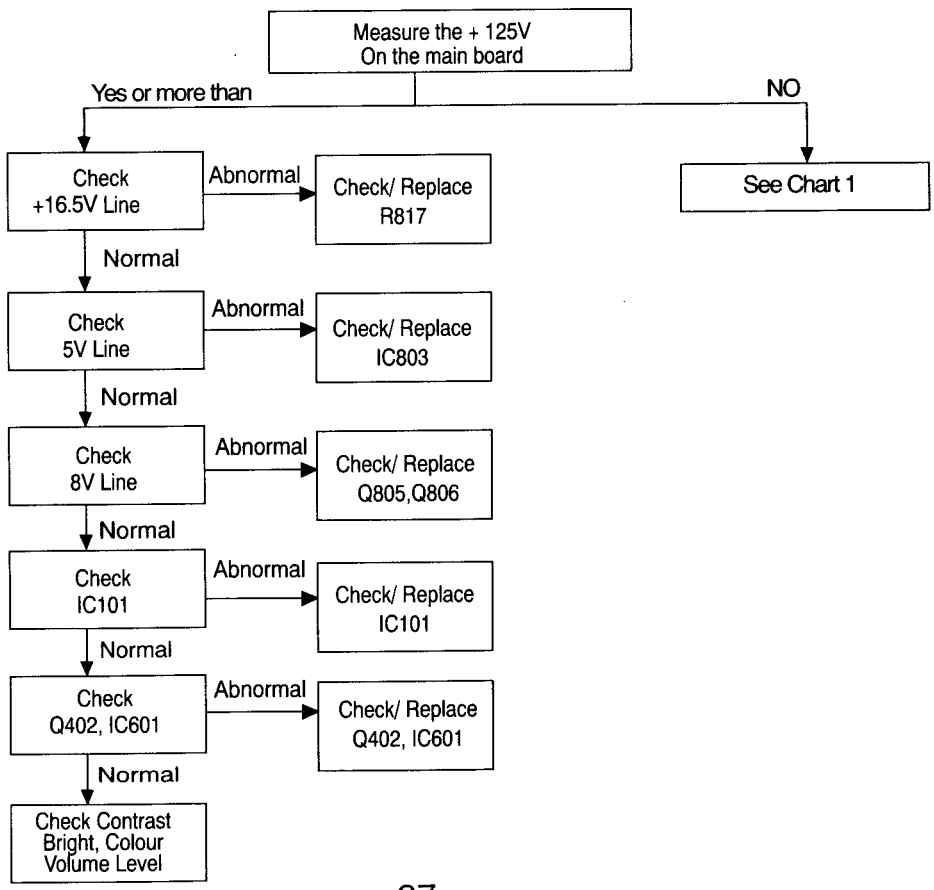
MEMO .....

8 .TROUBLESHOOTING CHARTS

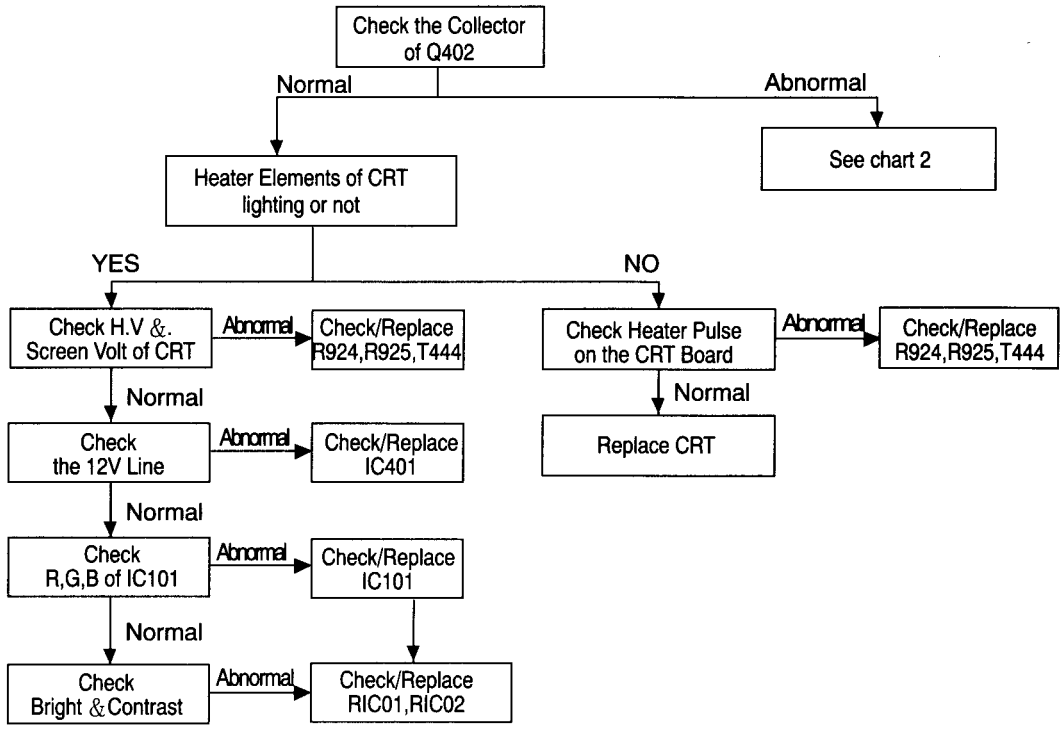
NO POWER : Chart 1



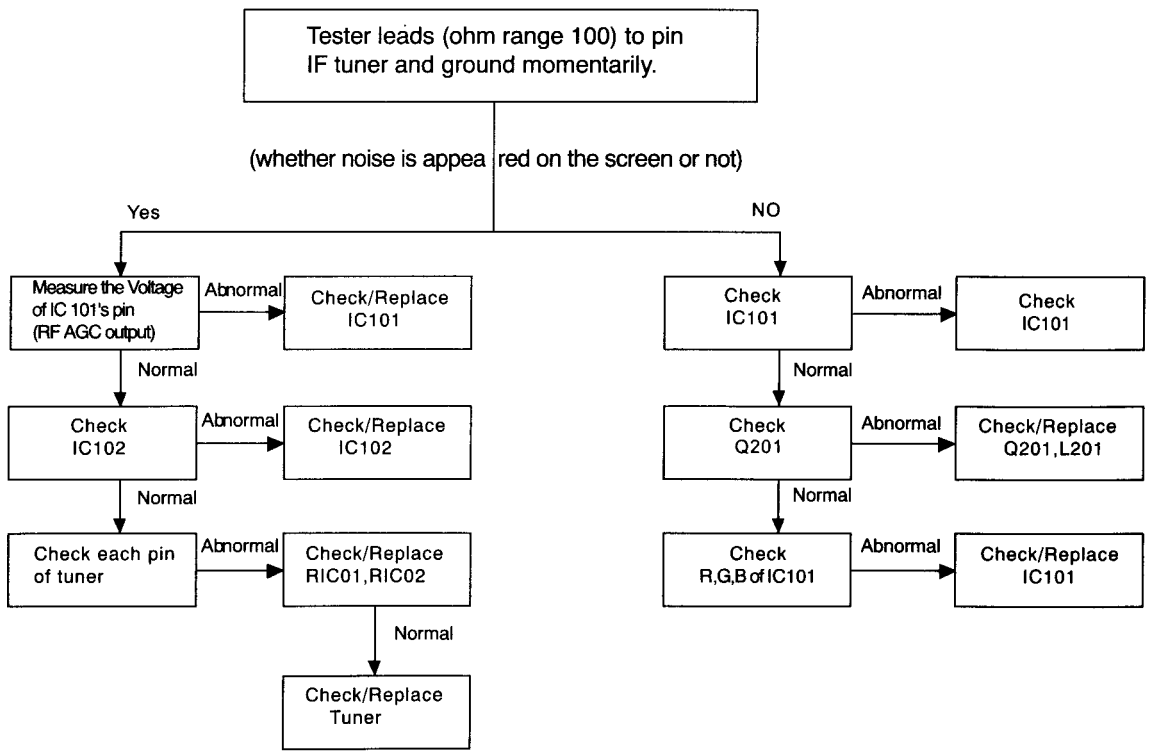
NO RASTER AND NO SOUND : Chart 2



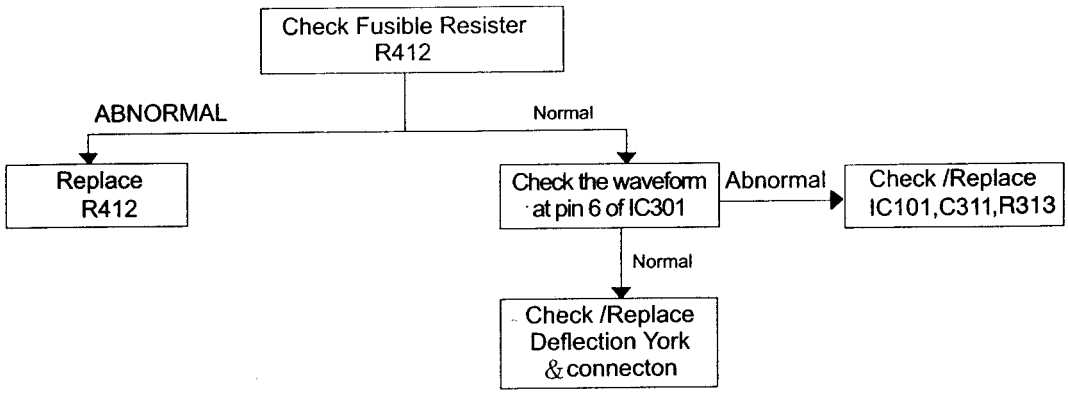
NO RASTER (SOUND OK) : Chart 3



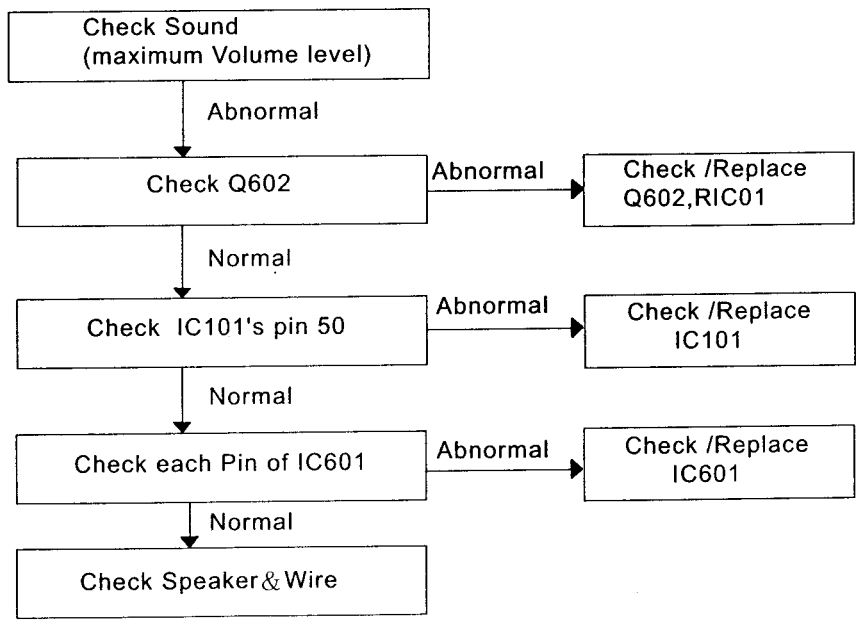
NO PICTURE (RASTER OK) : Chart 4



NO VERT SCAN (One Horiz, LINE RASTER) : Chart 5



NO SOUND (Picture OK) : Chart 6



MEMO .....

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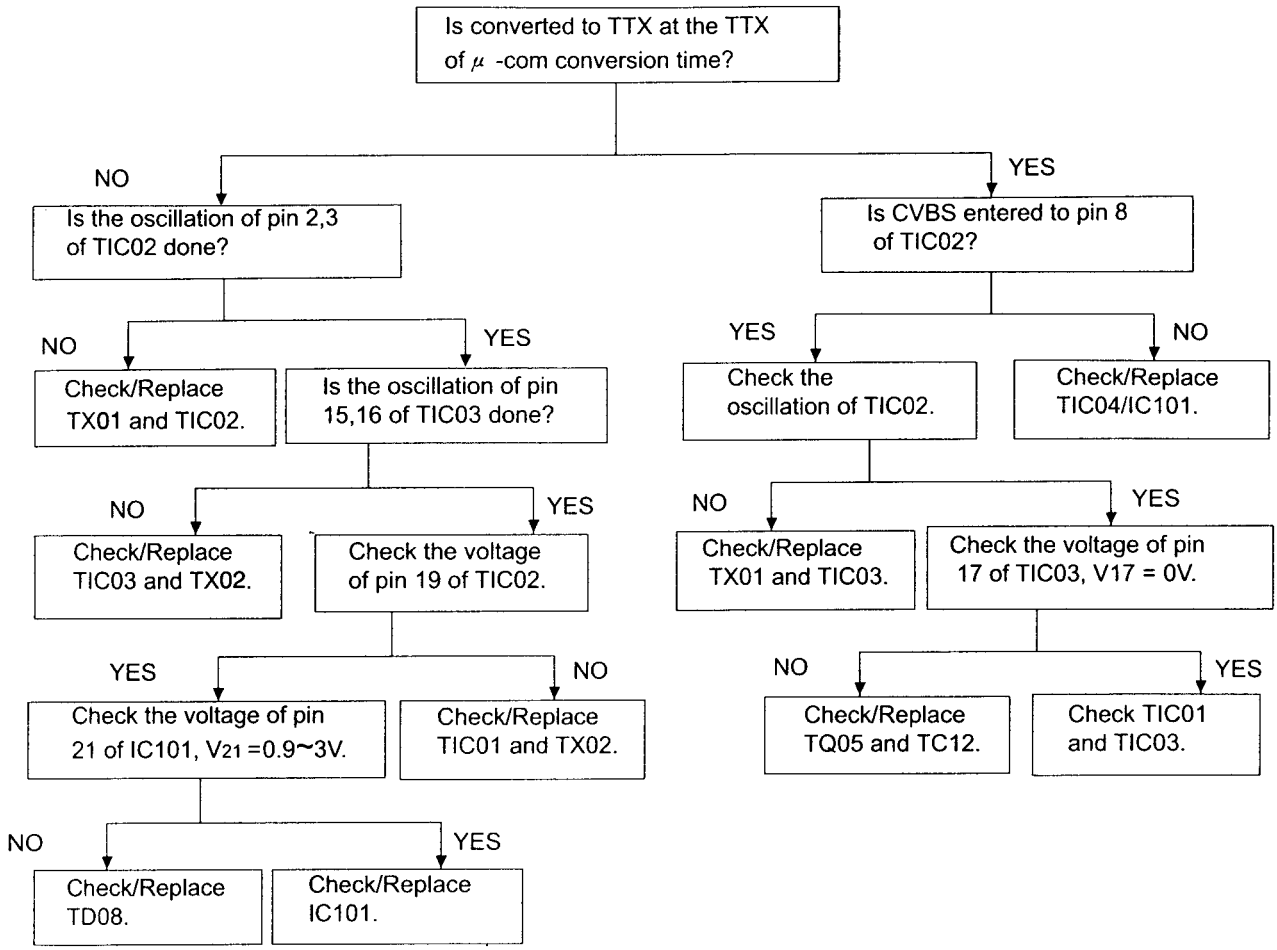
6. NO TTX(THE TV OPERATING IS O.K) : Chart 7

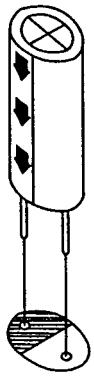


MEMO .....

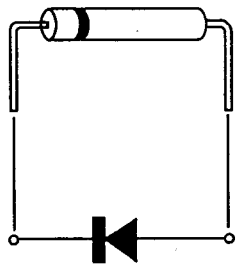
MEMO .....

9. INSERTING FROM OF THE IMPORTANT PARTS

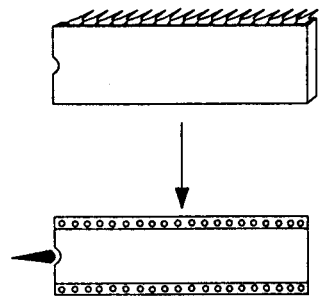
ELECTROLYTIC-
CONDENSER



DIODE



IC



TDA4661 (Pin 16)
TDA8362 (Pin 52)
SPM-109(Pin 42)
X24CO2P(Pin 8)
TDA8395(Pin 16)

TTX-OPTION

KM6264BL(Pin 28)
SAA5246P (Pin 48)
MAB8461P (Pin 28)
KS74HCTLS24IN(Pin 20)

TRANSISTOR

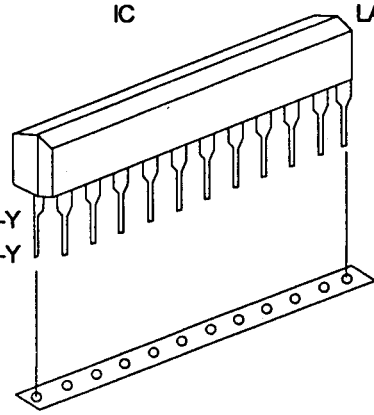
2SC4326
2SD1651
2SD1650

TRANSISTOR

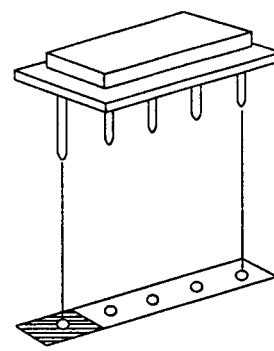
KSA815-Y
KSA539-Y

IC

LA7910(9 Pin)

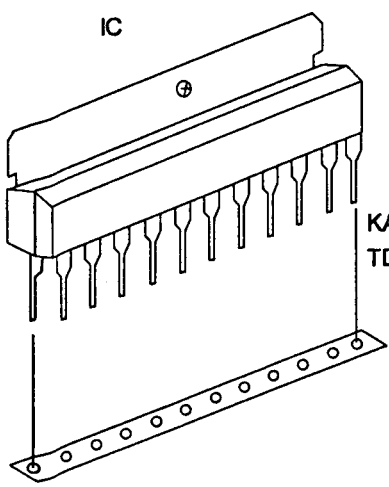


SAW-FILTER



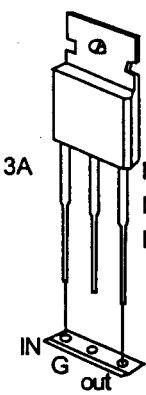
OFWG1956

IC



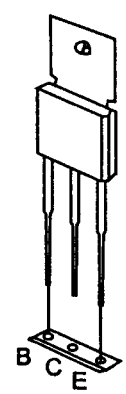
KA2131
TDA1013A

TRANSISTOR



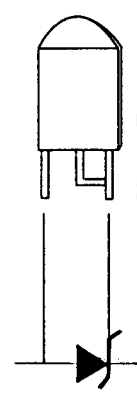
MC7812C
MC7808C
MC7805C

TRANSISTOR



2SC2068

IC



UPC574J
or
KA33V

10. CHASSIS REPLACEMENT PARTS LIST

ABBREVIATIONS :

CC	C-CERAMIC	RC	R-COMPOSITION
CE	C-ELECTROLYTIC	RD	R-CARBON
CFS	C-M,POLYESTER	RF	R-FUSIBLE
CK	C-CERAMIC,HK	RM	R-METAL,FILM
CQ	C-POLYPROPYLENE,POLYESTE	RP	R-CEMENT WIRE
CS	C-TANTALIUM,SOLID	RS	R-METAL,OXIDE

NOTE : The items with "*" are usually out of stock since they are seldom required for the routine service. There may be some anticipated delay when you order these items.

S.N.A. = Service Not Available , L/C = Local Purchase

The components identified by mark '**' are critical for safety. Replace only with Supplier part number specified.

When indicating parts by location number, Please include the PWB names (PWB = Printed Writing Board)

Loc No	Supplier Parts No.	Specification
	ASSY-PWB MAIN	
	*3T30-02061-090	CB5322AT/SGX
PWB	33004-147-481	P68SA (S.N.A)
	RESISTORS	
MR001	31018-377-122	RD 1/2T 1.2K-J
MR002	31018-377-122	RD 1/2T 1.2K-J
R100	31018-177-682	RD 1/8T 6.8K-J
R106	31018-177-391	RD 1/8T 390-J
R108	31018-377-471	RD 1/2T 470-J
R112	31018-177-682	RD 1/8T 6.8K-J
R113	31018-177-333	RD 1/8T 33K-J/ERD-S2TJ 3
R114	31018-177-104	RD 1/8T 100K-J/ERD-S2TJ
R115	31018-177-104	RD 1/8T 100K-J/ERD-S2TJ
R116	31018-177-561	RD 1/8T 560-J/ERD-S2TJ 5
R117	31018-177-562	RD 1/8T 5.6K-J/ERD-S2TJ
R118	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R122	31018-177-473	RD 1/8T 47K-J
R123	31018-177-473	RD 1/8T 47K-J
R124	31018-177-104	RD 1/8T 100K-J/ERD-S2TJ
R201	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R202	31018-177-181	RD 1/8T 180-J
R203	31018-177-131	RD 1/8T 130-J
R204	31018-177-109	RD 1/8T 1-J
R205	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R207	31018-177-622	RD 1/8T 6.2K-J
R208	31018-177-472	RD 1/8T 4.7K-J/ERD-S2TJ
**R209	31048-361-001	RM 1/2T 1K-G
**R210	31049-375-154	RM 1/2T 150K-F
R211	31018-177-750	RD 1/8T 75-J/ERD-S2TJ 75
R212	31018-177-750	RD 1/8T 75-J/ERD-S2TJ 75
R214	31018-177-470	RD 1/8T 47-J
R215	31018-177-273	RD 1/8T 27K-J
**R301	31049-276-102	RM 1/4T 1K-G
**R302	31049-275-162	RM 1/4T 1.6K-F
R303	31018-177-331	RD 1/8T 330-J/ERD-S2TJ 3
R304	31018-377-331	RD 1/2T 330-J
R305	31018-177-203	RD 1/8T 20K-J
R306	31018-377-159	RD 1/2T 1.5R-J
R307	31018-177-513	RD 1/8T 51K-J
R308	31018-177-183	RD 1/8T 18K-J
R309	31018-377-271	RD 1/2T 270-J
R310	31018-177-153	RD 1/8T 15K-J
R311	31018-177-224	RD 1/8T 220K-J
R312	31018-177-223	RD 1/8T 22K-J/ERD-S2TJ 2
R313	31018-377-105	RD 1/2T 1M-J
R401	31018-177-223	RD 1/8T 22K-J/ERD-S2TJ 2
R402	31018-177-273	RD 1/8T 27K-J
R404	31018-177-332	RD 1/8T 3.3K-J/ERD-S2TJ
R407	31018-377-124	RD 1/2T 120K-J
R408	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
R410	31018-377-271	RD 1/2T 270-J
R411	31018-377-680	RD 1/2T 68-J
**R412	31057-002-010	RF 1/2T 1-J
**R414	31059-427-151	RF 1P 150-J
**R415	31046-467-102	RS 1T 1K-J (AUTO)
R416	31018-377-473	RD 1/2T 47K-J
R417	31018-377-563	RD 1/2T 56K-J
**R418	31057-002-010	RF 1/2T 1-J
R419	B1010-0015	RF 1 T 150-J
R420	31018-177-824	RD 1/8T 820K-J
R500	31018-177-473	RD 1/8T 47K-J
R501	31018-177-562	RD 1/8T 5.6K-J/ERD-S2TJ
R502	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
R503	31018-177-104	RD 1/8T 100K-J/ERD-S2TJ
R505	31018-177-182	RD 1/8T 1.8K-J
R506	31018-177-182	RD 1/8T 1.8K-J
R507	31018-177-182	RD 1/8T 1.8K-J
R510	31018-177-750	RD 1/8T 75-J/ERD-S2TJ 75
R511	31018-177-750	RD 1/8T 75-J/ERD-S2TJ 75
R512	31018-177-750	RD 1/8T 75-J/ERD-S2TJ 75
R516	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
R517	31018-177-100	RD 1/8T 10-J
R518	31018-377-470	RD 1/2T 47-J
R519	31018-177-750	RD 1/8T 75-J/ERD-S2TJ 75

Loc No	Supplier Parts No.	Specification
R520	31018-177-154	RD 1/8T 150K-J
R521	31018-177-472	RD 1/8T 4.7K-J/ERD-S2TJ
R522	31018-177-472	RD 1/8T 4.7K-J/ERD-S2TJ
R523	31018-177-472	RD 1/8T 4.7K-J/ERD-S2TJ
R530	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R608	31018-177-273	RD 1/8T 27K-J
R609	31018-177-273	RD 1/8T 27K-J
R610	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
R614	31018-177-432	RD 1/8T 4.3K-J
R615	31018-177-203	RD 1/8T 20K-J
R616	31018-177-434	RD 1/8T 430K-J
R617	31018-177-562	RD 1/8T 5.6K-J/ERD-S2TJ
R618	31018-377-479	RD 1/2T 4.7-J
R619	31018-177-122	RD 1/8T 1.2K-J
R622	31018-177-241	RD 1/8T 240-J
R623	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
R624	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
R626	31018-177-562	RD 1/8T 5.6K-J/ERD-S2TJ
R637	31018-177-272	RD 1/8T 2.7K-J/ERD-S2TJ
R640	31018-177-821	RD 1/8T 820-J
R702	31018-177-203	RD 1/8T 20K-J
R703	31018-177-273	RD 1/8T 27K-J
R704	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
R705	31018-177-124	RD 1/8T 120K-J
R706	31018-177-202	RD 1/8T 2K-J/ERD-S2TJ 20
R707	31018-177-753	RD 1/8T 75K-J
R709	31018-177-202	RD 1/8T 2K-J/ERD-S2TJ 20
R710	31018-177-223	RD 1/8T 22K-J/ERD-S2TJ 2
R802	A1014-0033	RWC 10 H 4R7-J (R-S)
R803	31018-377-334	RD 1/2T 330K-J
R804	31018-377-683	RD 1/2T 68K-J
**R805	31046-567-104	RS 2T 100K-J
R806	31018-377-334	RD 1/2T 330K-J
**R807	31046-567-121	RS 2T 120-J(AUTO)
R808	31018-377-472	RD 1/2T 4.7K-J
R810	31018-377-102	RD 1/2T 1K-J
**R811	31046-567-183	RS 2T 18K-J(AUTO)
**R812	31047-567-471	RS 2T 470-J(AUTO)
**R813	31046-567-151	RS 2T 150-J(AUTO)
R814	31018-277-339	RD 1/4T 3.3-J
R815	31018-377-331	RD 1/2T 330-J
R816	31018-377-331	RD 1/2T 330-J
**R817	31057-002-130	RF 1/2T 0.47-K
**R818	31046-567-220	RS 2T 22-J(AUTO)
**R820	31046-567-120	RS 2T 12-J(AUTO)
R821	31018-177-391	RD 1/8T 390-J
**R822	31046-567-153	RS 2T 15K-J(AUTO)
**R823	31047-567-471	RS 2T 470-J(AUTO)
**R824	31046-567-101	RS 2T 100-J(AUTO)
**R826	31057-002-010	RF 1/2T 1-J
R827	31018-177-471	RD 1/8T 470-J
**R828	31046-567-120	RS 2T 12-J(AUTO)
**R830	31028-328-475	RC 1/2T 4.7M-K/ERC-12GK
**R831	31028-328-475	RC 1/2T 4.7M-K/ERC-12GK
R901	31018-177-152	RD 1/8T 1.5K-J
R902	31018-177-152	RD 1/8T 1.5K-J
R903	31018-177-152	RD 1/8T 1.5K-J

Loc No	Supplier Parts No.	Specification
R904	31018-177-751	RD 1/8T 750-J
R905	31018-177-751	RD 1/8T 750-J
R906	31018-177-751	RD 1/8T 750-J
R907	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R908	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R909	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R910	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
R911	31018-177-151	RD 1/8T 150-J
R913	31018-177-151	RD 1/8T 150-J
R914	31018-377-561	RD 1/2T 560-J
R915	31018-377-104	RD 1/2T 100K-J
R916	31018-377-104	RD 1/2T 100K-J
R917	31018-377-104	RD 1/2T 100K-J
**R918	31046-567-183	RS 2T 18K-J(AUTO)
**R919	31046-567-183	RS 2T 18K-J(AUTO)
**R920	31046-567-183	RS 2T 18K-J(AUTO)
**R921	31028-327-182	RC 1/2T 1.8K-J/ERC-12GJ
**R922	31028-327-182	RC 1/2T 1.8K-J/ERC-12GJ
**R923	31028-327-182	RC 1/2T 1.8K-J/ERC-12GJ
**R924	31057-201-025	RF 1T 0.47-K/RF 1S 0.47-
**R925	31057-201-018	RF 2T 1.8-J/RF 2S 1.8-J
RR01	31018-177-332	RD 1/8T 3.3K-J/ERD-S2TJ
RR02	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
RR03	31018-177-821	RD 1/8T 820-J
RR04	31018-177-153	RD 1/8T 15K-J
RR05	31018-377-103	RD 1/2T 10K-J
RR06	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
RR07	31018-177-472	RD 1/8T 4.7K-J/ERD-S2TJ
RR08	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
RR09	31018-177-202	RD 1/8T 2K-J/ERD-S2TJ 20
RR10	31018-177-202	RD 1/8T 2K-J/ERD-S2TJ 20
RR11	31018-177-162	RD 1/8T 1.6K-J
RR12	31018-177-823	RD 1/8T 82K-J
RR13	31018-177-203	RD 1/8T 20K-J
RR14	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
RR15	31018-177-752	RD 1/8T 7.5K-J
RR17	31018-177-472	RD 1/8T 4.7K-J/ERD-S2TJ
RR18	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR20	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
RR21	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
RR24	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR25	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR26	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR27	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR28	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR29	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
RR30	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR31	31018-177-470	RD 1/8T 47-J
RR37	31018-177-181	RD 1/8T 180-J
RR38	31018-177-222	RD 1/8T 2.2K-J/ERD-S2TJ
RR39	31018-177-223	RD 1/8T 22K-J/ERD-S2TJ 2
RR40	31018-177-181	RD 1/8T 180-J
RR42	31018-177-181	RD 1/8T 180-J
RR43	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR44	31018-177-102	RD 1/8T 1K-J/ERD-S2TJ 10
RR45	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
RR46	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1

Loc No	Supplier Parts No.	Specification
RR47	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
RR48	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
RR50	31018-177-202	RD 1/8T 2K-J/ERD-S2TJ 20
RR51	31018-177-682	RD 1/8T 6.8K-J
RR52	31018-177-222	RD 1/8T 2.2K-J/ERD-S2TJ
RR53	31018-177-222	RD 1/8T 2.2K-J/ERD-S2TJ
RR54	31018-177-222	RD 1/8T 2.2K-J/ERD-S2TJ
RR55	31018-177-222	RD 1/8T 2.2K-J/ERD-S2TJ
RR56	31018-177-272	RD 1/8T 2.7K-J/ERD-S2TJ
RR57	31018-177-221	RD 1/8T 220-J
RR58	31018-177-470	RD 1/8T 47-J
RR59	31018-177-223	RD 1/8T 22K-J/ERD-S2TJ 2
RR60	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
RR61	31018-177-681	RD 1/8T 680-J/ERD-S2TJ 6
TR01	31018-177-332	RD 1/8T 3.3K-J/ERD-S2TJ
TR06	31018-177-241	RD 1/8T 240-J
TR07	31018-177-471	RD 1/8T 470-J
TR08	31018-177-301	RD 1/8T 300-J
TR09	31018-177-100	RD 1/8T 10-J
TR10	31018-177-562	RD 1/8T 5.6K-J/ERD-S2TJ
TR11	31018-177-473	RD 1/8T 47K-J
TR13	31018-177-273	RD 1/8T 27K-J
TR14	31018-177-472	RD 1/8T 4.7K-J/ERD-S2TJ
TR15	31018-177-682	RD 1/8T 6.8K-J
TR17	31018-177-822	RD 1/8T 8.2K-J
TR20	31018-177-563	RD 1/8T 56K-J
TR24	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
TR25	31018-177-101	RD 1/8T 100-J/ERD-S2TJ 1
TR28	31018-177-103	RD 1/8T 10K-J/ERD-S2TJ 1
TR29	31018-177-330	RD 1/8T 33-J
TR33	31018-177-561	RD 1/8T 560-J/ERD-S2TJ 5
TR34	31018-177-561	RD 1/8T 560-J/ERD-S2TJ 5
TR35	31018-177-561	RD 1/8T 560-J/ERD-S2TJ 5
	VARIABLE RESISTORS	
VR101	31249-128-001	EVN DJA A03 B14/EVN CYA
VR201	31249-128-008	EVN DJA A03 B54/EVN CYA
VR301	31249-128-004	EVN DJA A03 B13/EVN CYA
VR401	31249-128-001	EVN DJA A03 B14/EVN CYA
VR402	31249-128-003	EVN DJA A03 B23/EVN CYA
VR801	31249-128-003	EVN DJA A03 B23/EVN CYA
VR901	31249-128-004	EVN DJA A03 B13/EVN CYA
VR902	31249-128-004	EVN DJA A03 B13/EVN CYA
VR903	31249-128-004	EVN DJA A03 B13/EVN CYA
VR904	31249-128-004	EVN DJA A03 B13/EVN CYA
VR905	31249-128-004	EVN DJA A03 B13/EVN CYA
	CAPACITORS	
C102	31407-101-140	CC45(T) SL 50V 120-J
C104	31417-109-220	CK45 TAPG F 50V 223-Z
C106	31607-401-460	CE04W TAPG 16V 47M
C109	31607-402-220	CE04W TAPG 50V 2.2M
C110	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C115	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C116	31507-127-016	ECQ B1 H 472J F3
C117	31607-402-220	CE04W TAPG 50V 2.2M

Loc No	Supplier Parts No.	Specification
C118	31607-401-435	CE04W TAPG 16V 10M-M
C119	31607-401-500	CE04W TAPG 16V 470M-M(SG
C120	31607-902-250	CE04W TAPG 50V 0.22M
C121	31607-402-200	CE04W TAPG 50V 0.47M
C122	31607-402-070	CE04W TAPG 35V 22M
C123	31607-402-200	CE04W TAPG 50V 0.47M
C124	31607-902-250	CE04W TAPG 50V 0.22M
C125	31607-402-210	CE04W TAPG 50V 1M
C201	31507-127-010	ECQ B1H 473J F3/2E 63V 4
C202	31607-401-435	CE04W TAPG 16V 10M-M
C203	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C204	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C205	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C206	31607-401-500	CE04W TAPG 16V 470M-M(SG
C207	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C208	31607-401-470	CE04W TAPG 16V 100M VENT
**C209	31517-003-020	CFS922M TAPG 400V 104-J
C302	31507-127-003	ECQ B1 H 332J F3
C303	31507-127-011	ECQ B1H 683J F3/2E 63V 6
C304	31507-127-024	ECQ-V1H 224J Z3/3E 63V 2
C305	31607-904-332	CE04W TAPG 25V 3300M-M(1
C306	31607-402-220	CE04W TAPG 50V 2.2M
C307	31607-402-290	CE04W TAPG 50V 100M-M(SG
C309	31507-127-016	ECQ B1 H 472J F3
C310	31507-127-022	ECQ B1 H 513J F3
C311	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C312	31507-127-016	ECQ B1 H 472J F3
C401	31607-402-220	CE04W TAPG 50V 2.2M
C402	31507-127-002	ECQ B1H 222J F3
C403	31417-109-220	CK45 TAPG F 50V 223-Z
C404	31417-104-490	CK45 TAPG D 50V 272-M
C405	31507-127-000	ECQ B1 H 102J F3
C409	31507-137-013	ECQ-B 1 103J F3
C411	A1102-0205	CF 922 P 1.6KV T 632-J B
C414	31607-402-710	CE04W TAPG 35V 1000M-M
C416	31607-403-500	CE04W TAPG 250V 22M-M
**C417	31516-390-002	CFS 922M TAPG 200V 434-J
C418	31607-403-450	CE04W TAPG 250V 1M
C419	31607-401-720	CE04W TAPG 25V 1000M-M
C420	31607-401-500	CE04W TAPG 16V 470M-M(SG
C422	31417-106-090	CK45 TAPG B 500V 471-K
C423	31417-106-090	CK45 TAPG B 500V 471-K
C424	31417-106-090	CK45 TAPG B 500V 471-K
C501	31407-057-180	CC45(T) CH 50V 180-J
C503	31507-127-016	ECQ B1 H 472J F3
C504	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C505	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C506	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C507	31607-401-435	CE04W TAPG 16V 10M-M
C508	31607-401-435	CE04W TAPG 16V 10M-M
C509	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C510	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C511	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C512	31507-127-008	ECQ B1 H 223J F3
C513	31607-401-460	CE04W TAPG 16V 47M
C515	31417-104-400	CK45 TAPG B 50V 102-K

Loc No	Supplier Parts No.	Specification
C516	31417-104-400	CK45 TAPG B 50V 102-K
C521	31607-401-435	CE04W TAPG 16V 10M-M
C550	31607-401-500	CE04W TAPG 16V 470M-M(SG
C609	31607-974-003	CE04W TAPG 50V 10M-M(N.P
C610	31607-803-730	CE04W TAPG 50V 4.7M-NP
C612	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
C613	31507-127-008	ECQ B1 H 223J F3
C615	31507-127-024	ECQ-V1H 224J Z3/3E 63V 2
C616	31607-402-210	CE04W TAPG 50V 1M
C617	31607-401-770	CE04W TAPG 25V 2200M-M(S
C618	31607-803-280	CE04W TAPG 50V 1U-M(NP)
C620	31607-402-130	CE04W TAPG 35V 470M-M
C621	31507-127-002	ECQ B1H 222J F3
C623	31607-402-250	CE04W TAPG 50V 10M
C624	31507-127-015	ECQ B1 H 392J F3
C625	31407-105-260	CC45(T) CH 50V 470-J
C626	31407-105-660	CC45(T) CH 50V 101-J
C627	31407-105-660	CC45(T) CH 50V 101-J
C628	31407-105-660	CC45(T) CH 50V 101-J
C630	31407-105-280	CC45(T) CH 50V 560-J
C633	31507-127-002	ECQ B1H 222J F3
C701	31607-401-435	CE04W TAPG 16V 10M-M
C702	31607-401-435	CE04W TAPG 16V 10M-M
C800	31507-127-002	ECQ B1H 222J F3
**C801	31516-002-140	ECQ-E2A 224M N86(TAPG)
**C802	31566-903-120	ECQ-E2A 474 N49
C803	31467-502-220	CK45P TAPG E250V 222-Z(1
C804	31467-502-220	CK45P TAPG E250V 222-Z(1
C805	31467-502-220	CK45P TAPG E250V 222-Z(1
C806	31467-502-220	CK45P TAPG E250V 222-Z(1
**C807	31517-010-000	CFS922M TAPG 630V 0.022-
C808	31417-767-331	CK45(T) B2KV 331-K
C810	31417-901-400	CK45(T) B2KV 561-K
C811	31417-901-400	CK45(T) B2KV 561-K
C830	31466-105-010	CK45P E400V 332-M(T4KV)
C837	31607-401-500	CE04W TAPG 16V 470M-M(SG
C851	31606-403-780	CE04W 400V 100M-M(LIG)R
C852	31607-401-500	CE04W TAPG 16V 470M-M(SG
C853	31607-403-250	CE04W TAPG 160V 100M-M
C854	31607-403-230	CE04W TAPG 160V 33M-M
C855	31607-401-720	CE04W TAPG 25V 1000M-M
C857	31607-402-250	CE04W TAPG 50V 10M
C858	31607-401-290	CE04W TAPG 10V 220U
C901	31407-047-221	CC45(T) RH 50V 221-J
C902	31407-105-120	CC45(T) CH 50V 121-J
C903	31407-105-120	CC45(T) CH 50V 121-J
C904	31417-104-250	CK45 TAPG B 50V 471-K
C905	31417-104-250	CK45 TAPG B 50V 471-K
C906	31417-104-250	CK45 TAPG B 50V 471-K
C907	31417-767-102	CK45(T) B2KV 102-K
C908	31607-403-450	CE04W TAPG 250V 1M
RC01	31507-127-001	ECQ B1 H 152J F3
RC02	31507-127-025	ECQ-V1H 334J Z3/3E 63V 3
RC03	31507-127-025	ECQ-V1H 334J Z3/3E 63V 3
RC04	31607-401-435	CE04W TAPG 16V 10M-M
RC05	31607-401-435	CE04W TAPG 16V 10M-M
RC06	31607-401-435	CE04W TAPG 16V 10M-M

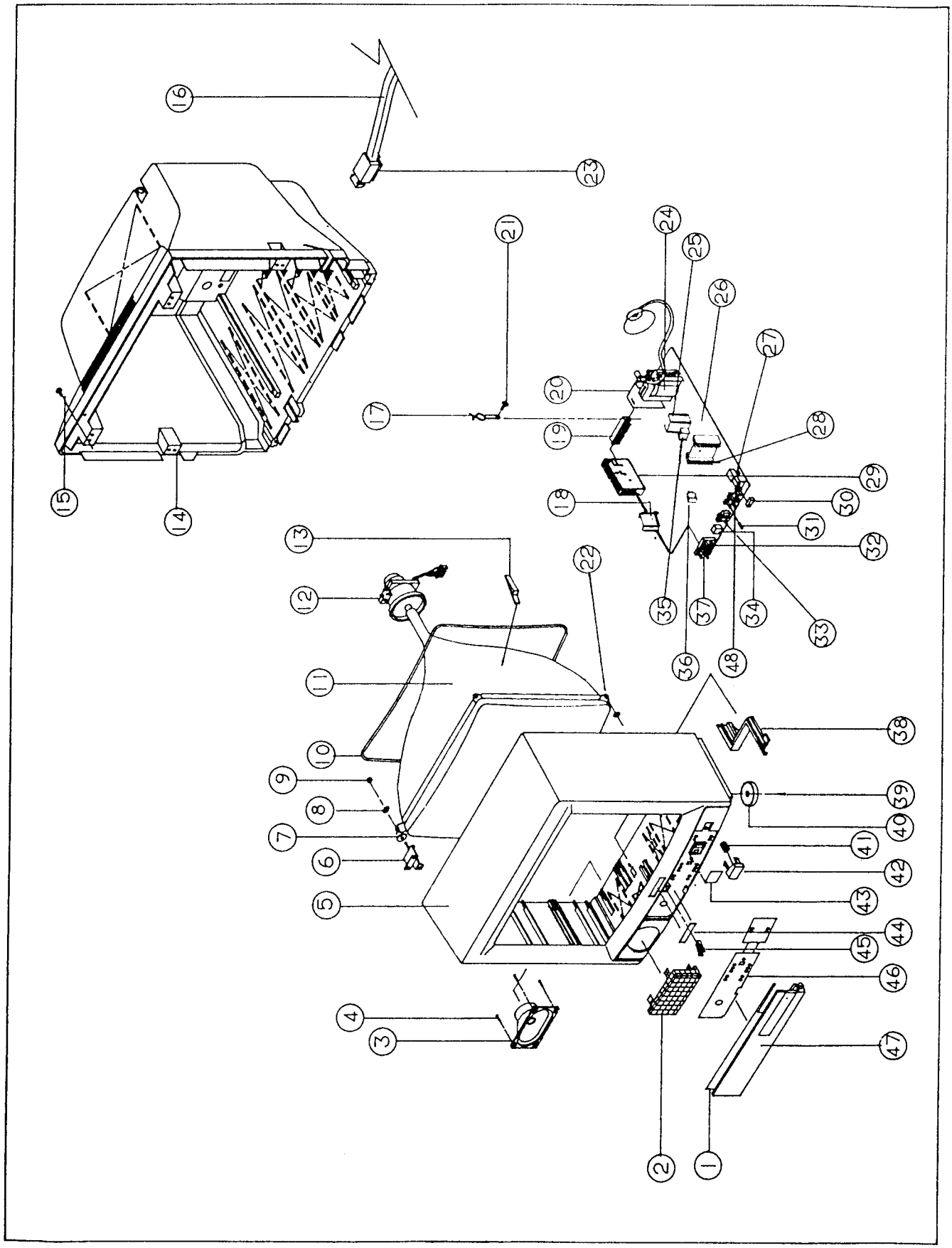
Loc No	Supplier Parts No.	Specification
RC07	31607-401-435	CE04W TAPG 16V 10M-M
RC08	31507-127-002	ECQ B1H 222J F3
RC09	31407-057-330	CC45(T) CH 50V 330-J
RC10	31607-401-450	CE04W TAPG 16V 33M
RC12	31607-401-840	CE04W TAPG 10V 100M-M
RC13	31417-344-104	CK45 TAPG F 50V 104-Z
RC16	31607-401-840	CE04W TAPG 10V 100M-M
RC17	31407-105-700	CC45(T) CH 50V 151-J
RC21	31417-104-400	CK45 TAPG B 50V 102-K
RCT01	31497-009-340	EXF-FP4 331MDV(5P 331)
TC01	31417-344-104	CK45 TAPG F 50V 104-Z
TC02	31607-401-140	CE04W TAPG 6.3V 1000M-M
TC03	31607-401-450	CE04W TAPG 16V 33M
TC04	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
TC05	31407-106-870	CC45(T) RH 50V 100-C
TC06	31417-109-140	CK45 TAPG F 50V 103-Z
TC07	31407-106-250	CC45(T) SL 50V 331-J
TC08	31407-106-150	CC45(T) RH 50V 150-J
TC09	31417-104-400	CK45 TAPG B 50V 102-K
TC10	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
TC11	31507-127-012	ECQB1 H 104J-F3/2E 63V 1
TC15	31417-109-140	CK45 TAPG F 50V 103-Z
TC16	31407-105-660	CC45(T) CH 50V 101-J
TC17	31417-109-140	CK45 TAPG F 50V 103-Z
TC18	31607-401-840	CE04W TAPG 10V 100M-M
TC21	31607-402-530	CE04W TAPG 50V 0.47U-NP
TC22	31607-402-530	CE04W TAPG 50V 0.47U-NP
		I C
**DZ824	32119-101-360	KA 33V(TAPG)
IC101	B4012-0188	TDA8362B/N3 DIP
IC102	32119-201-270	LA7910
**IC402	32117-901-110	MC7812C (AUTO)
IC501	32119-110-089	TDA4661
**IC801	32116-910-017	SDH-209B(R)
RIC01	32109-110-072	SPM109B/PCA84C640P-051
RIC02	B4000-0050	XLS24C04P DIP
RIC03	32119-110-061	KIA7033P(T)
TIC01	32109-210-026	KM62264BLS-10/7
TIC02	32109-110-082	SAA5246P/E M6
TIC04	32119-101-010	TEA2014
		TRANSISTORS
Q201	32137-301-720	KSC 815-Y(TAPG)
**Q401	32137-301-560	KSC 2331-Y(TAPG)
Q501	32137-401-530	KSA 539-Y(TAPG)
Q502	32137-401-530	KSA 539-Y(TAPG)
Q503	32137-401-530	KSA 539-Y(TAPG)
Q601	32137-301-720	KSC 815-Y(TAPG)
Q602	32137-401-530	KSA 539-Y(TAPG)
Q703	32137-401-530	KSA 539-Y(TAPG)
Q704	32137-301-720	KSC 815-Y(TAPG)
Q705	32137-301-720	KSC 815-Y(TAPG)
**Q803	32137-301-560	KSC 2331-Y(TAPG)
**Q806	32137-301-560	KSC 2331-Y(TAPG)
Q901	32137-301-230	KSC 1507-O (AUTO)
Q902	32137-301-230	KSC 1507-O (AUTO)

Loc No	Supplier Parts No.	Specification
Q903	32137-301-230	KSC 1507-O (AUTO)
Q905	32137-401-530	KSA 539-Y(TAPG)
RQ01	32137-301-720	KSC 815-Y(TAPG)
RQ05	32137-301-720	KSC 815-Y(TAPG)
RQ09	32137-301-720	KSC 815-Y(TAPG)
RQ10	32137-301-720	KSC 815-Y(TAPG)
RQ11	32137-301-720	KSC 815-Y(TAPG)
RQ12	32137-401-530	KSA 539-Y(TAPG)
TQ03	32137-301-720	KSC 815-Y(TAPG)
TQ04	32137-301-720	KSC 815-Y(TAPG)
	DIODES	
D101	32167-201-070	1N4003 TAPG
D102	32167-406-480	1N4148 TAPG
D201	32167-201-070	1N4003 TAPG
D301	32167-406-480	1N4148 TAPG
D302	32167-201-170	TVR10G(TAPG)
D303	32167-406-480	1N4148 TAPG
D401	32167-208-510	ERB 43-04 TAPG
D402	32167-208-510	ERB 43-04 TAPG
D403	32167-208-510	ERB 43-04 TAPG
D404	32167-201-070	1N4003 TAPG
D405	32167-201-070	1N4003 TAPG
D410	32167-406-480	1N4148 TAPG
D411	32167-406-480	1N4148 TAPG
D513	32167-406-480	1N4148 TAPG
D601	32167-406-480	1N4148 TAPG
D704	32167-406-480	1N4148 TAPG
D705	32167-406-480	1N4148 TAPG
D800	32167-401-041	ENC431D-10A(TAPG)
D801	32167-208-580	ERB 12-06 TAPG
D802	32167-208-580	ERB 12-06 TAPG
D803	32167-208-580	ERB 12-06 TAPG
D804	32167-208-580	ERB 12-06 TAPG
D805	32167-201-100	ERB06-15(TAPG)
D806	32167-207-120	1R5GU41(TAPG)
D807	32167-207-120	1R5GU41(TAPG)
D809	32167-406-480	1N4148 TAPG
D810	32167-406-480	1N4148 TAPG
D811	32167-201-250	RP104(TAPG)
DZ501	32167-406-080	MTZ 5.1B
DZ801	32167-406-130	MTZ 9.1B
DZ802	32167-406-260	MTZ8.2
DZ812	32167-401-810	MTZ6.2C
DZ825	32167-441-009	MTZ7.5C
RD01	32167-406-480	1N4148 TAPG
RD03	32167-406-480	1N4148 TAPG
RD04	32167-406-480	1N4148 TAPG
RD06	32167-406-480	1N4148 TAPG
RD08	32167-406-480	1N4148 TAPG
RD09	32167-406-480	1N4148 TAPG
RD10	32167-406-480	1N4148 TAPG
RD11	32167-406-480	1N4148 TAPG
RD14	32167-101-130	1K34A (TAPG)
RDZ01	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
RDZ02	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
RDZ03	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
RDZ04	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
RDZ05	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
TD04	32167-406-480	1N4148 TAPG
TD05	32167-406-480	1N4148 TAPG
TD06	32167-406-480	1N4148 TAPG
TD07	32167-406-480	1N4148 TAPG
TD08	32167-406-480	1N4148 TAPG
TDZ02	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
TDZ04	32167-401-800	EQA02-06A/MTZ5.6B(TAPG)
	POSISTOR	
**P801	32189-609-402	PTH451C262BF140M270
	MODULE REMOCON	
**PR01	32196-411-002	SR-5CP(R)
	LED	
**LD01	32309-110-230	DS2 (DL-ILR)/SL-5R
	COILS	
D-COIL	32479-029-340	30RT81L2300(D)
L102	32427-904-918	AL02-1R0K
L103	32427-904-922	AL02-5R6K
L104	32427-904-922	AL02-5R6K
L105	32427-904-922	AL02-5R6K
L201	32427-904-923	AL02-8R2K
L402	32449-412-650	180UH/480UH
L403	32426-833-020	6.8MH-K ROBOT
L404	32446-705-040	157UH (R-S)
L601	32427-904-925	AL02-120K
L802	32426-633-090	39MHX2(U)R
L805	32429-226-330	100UH-K(1.0A),BASE
L824	32426-226-200	43UH/1.0A ROBOT
L901	32427-805-858	AL03 331-K
RL01	32427-904-924	AL02-100K(10UH)
RL02	32427-904-924	AL02-100K(10UH)
RL03	32427-904-924	AL02-100K(10UH)
RL04	32427-904-924	AL02-100K(10UH)
TL01	32427-805-835	AL03 3R9-K
	TRANS	
T104	32717-513-800	38.9MHZ(S-60)
**T401	32846-070-007	7.3MH/105UH(R-S)
**T801	32896-002-481	P:180-280 S:125/18V ER35
	TRANS FLYBACK	
**T444	32859-200-000	FCM-20A015
	CRT-SOCKET	
**V999	33356-063-680	HF-29.1S(R-S)
	TUNER	
**TU001	34519-700-020	TECC2985VA14B
	FILTERS	

Loc No	Supplier Parts No.	Specification
Z201	34527-460-004	TPS5.5MB TF21
Z601	34527-460-030	SFSH5.5MCB-TF21
Z203	34527-460-061	TPS5.74MBTF21
Z101	34529-440-013	OFWG1956
		CRYSTALS
TX01	B1280-0090	27MHZ HC-49/U-A 20PPM 99
RX01	34537-001-000	10MHZ
X501	34539-011-010	HC-49/U 4.433619MHZ
		FUSE
**F801	34709-084-730	FST 250V 3.15A 20MM SEMK
		MISCELLANEOUS
CN201	33347-108-310	67094-003(AUTO)
CN402	33347-114-810	YW025-04(AUTO)
CN44	33124-111-100	1P AUTO
CN601	33347-108-310	67094-003(AUTO)
CN801	33124-111-100	1P AUTO
CN803	33347-108-140	67094-006 (AUTO)
CN901	33058-372-014	B10XB10/F/350
F801	33167-001-001	PFC 5000-0202
GT02	33124-111-100	1P AUTO
L400	34047-019-060	3.5X6X1.0
L503	34047-019-060	3.5X6X1.0
L804	34047-019-060	3.5X6X1.0
RCJ01	33136-103-030	HXC-1510-01-300A(R)
SW101	33609-101-028	JTM-1112B/KPT-2104-22
SW102	33596-001-001	JTR-1104(RO)
SW103	33596-001-002	JTR-1105(R-S)
SW801	33529-402-006	ESB-99835V/ESB-99832V
TBC	33124-111-100	1P AUTO
TL02	34047-019-060	3.5X6X1.0
		ASSY-H/S VERT(STICK)
	*3H82-00270-000	35684-116-210 TDA1013A
IC601	32119-201-070	TDA1013A/N4
H/SINK	35684-116-211	SPC-1 T1.0 FT2
SCREW	37158-230-061	2S-3X6 FE FZY
		ASSY-H/S VERT
	*3H82-00360-000	35684-121-410,KA2131
IC301	32119-102-300	KA 2131
H/SINK	35684-121-410	SPC-1 T1.0 FTZ
SCREW	37158-230-061	2S-3X6 FE FZY
		ASSY-H/S VERT(HORI)
	*3H82-00360-003	35684-121-410,KSD5072YD
**Q402	32139-410-020	KSD5072YD
H/SINK	35684-121-410	SPC-1 T1.0 FTZ
SCREW	37158-230-081	2S-3X8FE FZY P-TYPE
WASHER	37334-105-910	SPC-1 T1.0 FZY-1
		ASSY-H/S POWER
	*3H83-00440-004	35682-112-060,2SC4538

Loc No	Supplier Parts No.	Specification
**Q801	32159-210-060	2SC4538
H/SINK	35682-112-060	A6063 EXTR WHT
SCREW	37158-230-101	2S-3X10 FE FZY
WASHER	37334-105-910	SPC-1 T1.0 FZY-1
		ASSY-H/S TR
	*3H84-00160-000	35684-122-110,MC7805C
**IC803	32117-401-110	MC7805C (AUTO)
H/SINK	35684-122-110	A6063 EXTR TO220
SCREW	37158-230-061	2S-3X6 FE FZY
		ASSY-H/S TR
	*3H84-00160-004	35684-122-110,KSC2073,
**Q805	32147-301-020	KSC 2073 (AUTO)
H/SINK	35684-122-110	A6063 EXTR TO220
SCREW	37158-230-061	2S-3X6 FE FZY
		ASSY-POWER,CORD
CN801	33053-816-510	KKD-419C KLCE-2F,F,BLK-H
HOLD/C	33323-0001-000PP	V0 BLK
		ASSY-CRT
CRT	32019-400-073	A51KQJ63X/54HGB99X
D Y	32439-400-008	DST2192ML
C Y	34099-023-010	JH-8210,NY-291/PI29.1
SP-DY	36814-101-911	NEOPRENE V0 BLK
		ASSY-TRANSMITTER
	*3F14-00033-070	TM33,RM109,S-TTX,38,E,S
		ASSY-SPEAKER
	*3H73-10241-002	05F14BRA,L400
LEAD/C	33058-003-016	S3(2)/F/400
SPK	34209-200-020	05F14BRA,8R,3W
		ASSY-ACCESSORY
LABEL	38114-597-900	ART PAPER 90S
CARD/F	38124-121-320	ART PAPER 100,QUELLE
CARD/W	38124-121-790	ART PAPER 120(FTZ)
SVC/N	38134-379-010	ART PAPER 100
I/B	38134-426-810	ART PAPER 120 P68T TTX T
I/B	38134-426-910	ART PAPER 120 P68T TTX T
PE-BAG	38653-107-410	PE 0.05X141X197 340
PE-BAG	38653-108-191	HDPE T0.015 230X400 L-TY

11. EXPLODED-VIEW



CB5322AT/SGX

The items with "*" are usually out of stock since they are seldom required for the routine service. There may be some anticipated delay when you order these items.

*** S.N.A = SERVICE NOT AVAILABLE. ***

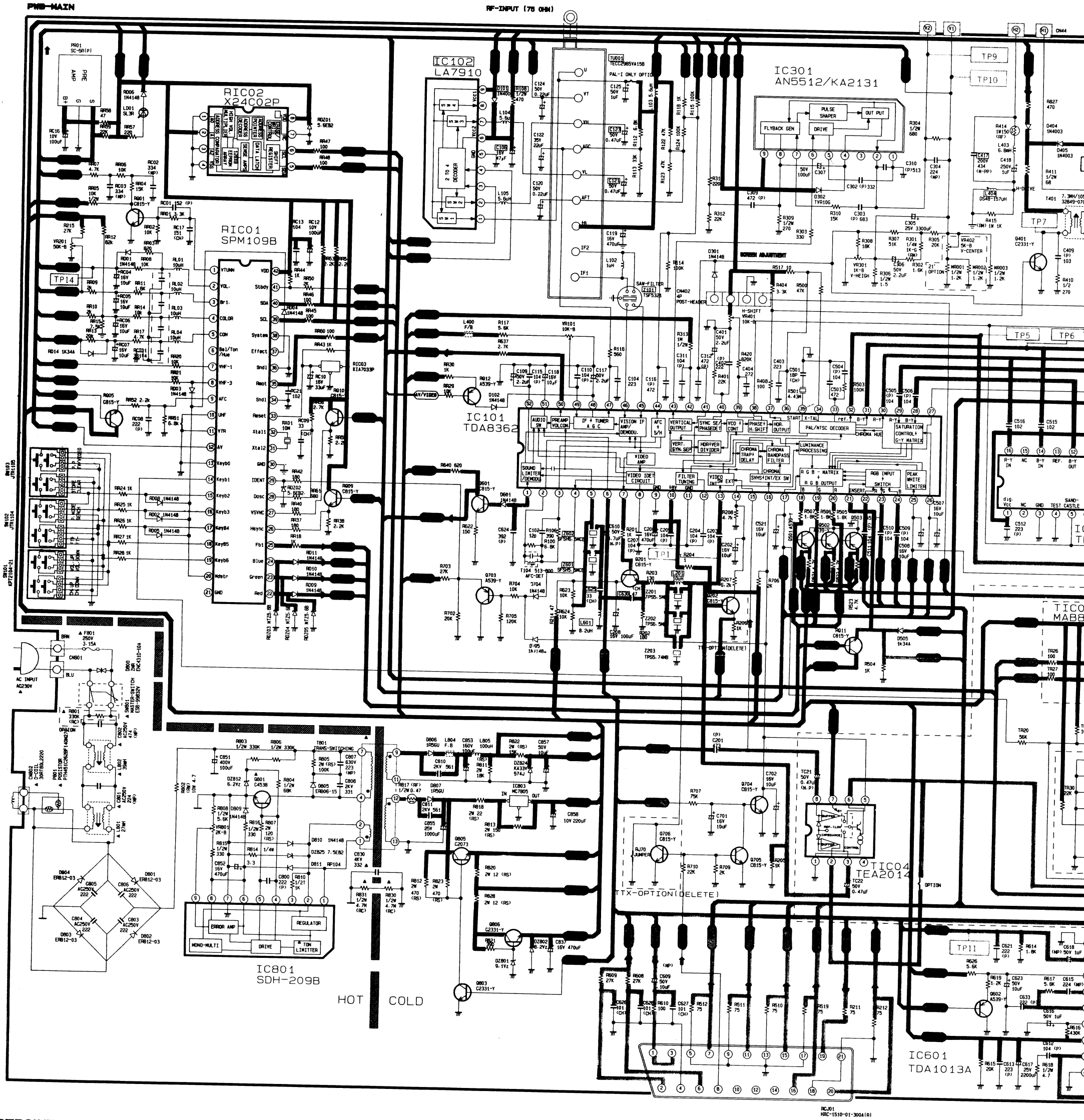
NO	CODE NO	DESCRIPTION	SPECIFICATION	Q'TY
1	38013-115-210	PVC-DOOR,INSIDE	PVC SHEET T0.3	1
2	37713-223-910	GRILLE-WOOFER	SPC-1 T0.5 4R #677	1
3	34209-200-020	SPEAKER-GENERAL	O5F14BRA, 8R 3W	1
4	37148-530-121	SCREW-TAP,RH	2S-3X12 FE FZY	4
5	*3G90-53220-180	ASSY-CABINET,FRONT	HIPS HB BLK #066	1
	36001-627-010	CABINET-FRONT	HIPS HB BLK #066	1
6	36614-212-730	BRACKET-CRT	SBHG-1 T1.6	4
7	37333-101-020	WASHER-GUM,CRT	NATURAL RUBBER BLK	4
8	DELETE ITEM			
9	37204-101-410	NUT-CRT	M5 NUT+W/S AUTO	2
10	32479-029-340	COIL-DEGAUSSING	30RT81L2300(D)	1
11	32019-400-073	CRT-COLOR	A51KQJ63X/54HGB99X	1
12	32439-400-008	DEFL-YOKE	DST2192ML	1
13	36814-101-911	SPACER-DY	NEOPRENE V0 BLK	4
14	36001-634-010	CABINET-BACK	HIPS V0 BLK	1
15	37148-540-153	SCREW-TAP,RH	2S-4X15 FE FZB	6
16	33053-816-510	POWER-CORD,ASSY	KKD-419C KLCE-2F,F	1
17	DELETE ITEM			
18	*3H82-00270-000	ASSY-H/S,VERT(STICK)	TDA1013A	1
19	33136-103-030	RECEPTACLE-PERI	HXC-1510-01-300A(R)	1
20	*3H82-00360-003	ASSY-H/S,VERT(HORI)	KSD5027Y	1
21	DELETE ITEM			
22	37204-101-410	NUT-CRT	M5 NUT+W/S AUTO	1
23	33323-0001-000	HOLDER-CORD	P.P V0 BLK	1
24	32859-200-000	TRANS-FLYBACK	FCM-20A015	1
25	*3H82-00360-000	ASSY-H/S,VERT	KA2131	1
26	*3T83-02061-090	ASSY-CHASSIS(OPTION)	CB5322AT/SGX	1
	33004-147-481	PWB-MAIN<S.N.A>	P68SA	1
27	33529-402-006	SWITCH-PUSH,POWER	ESB-99835V/ESB-99832V	1
28	*3H84-00440-004	ASSY-H/S,POWER	2SC4538	1
29	34519-700-020	TUNER	TECC-2985VA14B	1
30	37624-623-611	KNOB-SUB,MASTER	ABS HB BLK	1
31	DELETE ITEM			
32	33596-001-001	SWITCH-RUBBER	JTR-1104	1
33	32309-110-230	LED-GUIDE,ASSY	DS2(DL-ILR)/SL-5R	1

NO	CODE NO	DESCRIPTION	SPECIFICATION	Q'TY
34	32196-411-002	MODULE-REMOCON	SR-5CP(R)	1
35	*3H84-00160-000	ASSY-H/S,TR	MC7805C	1
36	*3H84-00160-004	ASSY-H/S,TR	KSC2073	1
37	33596-001-002	SWITCH-RUBBER	JTR-1105	1
38	36022-118-710	RAIL-PCB	ABS V0 GRAY	1
39	37148-540-121	SCREW-TAP,RH	2S-4X12 FE FZY	2
40	36604-138-710	HOLDER-LEG	ABS HB HF GOLD	2
41	36674-140-850	SPRING-COIL	SUS 0.05 CX-5322T	1
42	37623-153-910	KNOB-POWER	PC GE LEXAN #141	1
43	38014-159-210	INDICATOR-WINDOW	PC SHEET T0.5	1
44	38024-182-510	BADGE-BRAND	AL-FORGING SILVER	1
45	36698-100-110	CATCH-PUSH,DOOR	KIFUCO, LA701	1
46	38092-109-860	PVC-CONTROL	PVC SHEET T0.3 BLK	1
47	37743-108-520	DOOR-VR,BOX	PC GE LEXAN #141	1
48	33609-101-028	SWITCH-TACT,BLOCK	JTM-1112B/KPT-2104-22	1

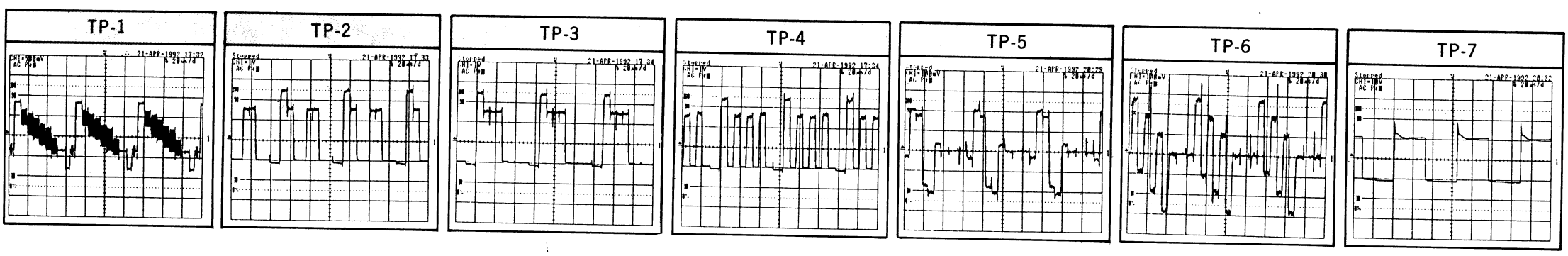
MEMO

SCHMATIC DIAGRAM

MODEL : CK5051AT
BOARD NAME: MAIN SYSTEM. PAL. SECAM-B/G. D/K, PAL-I



TESTPOINT WAVEFROM



IC301
AN5512/KA2131

IC502
TDA8395

IC501
TDA4661

IC601
TDA1013A

TIC03
MAB8461P/W115 SIMPLE TTX OPTION(DELETE)

TIC02
SAA5246P/H-M6

TIC04
TEA2014

TTX-OPTION(DELETE)

TTX OPTION-PAR

EAR-PHONE
OPTION-PART

SCREEN ADJUSTMENT

FOCUS

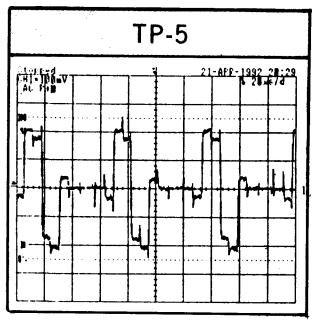
SCREEN

PWR-CRT

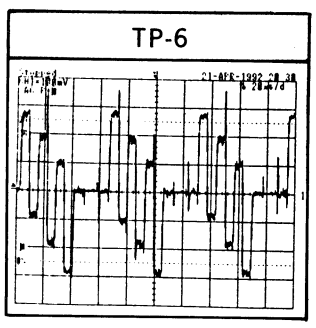
CN803 6P POSTHEADER

CN601 TO SPEAKER

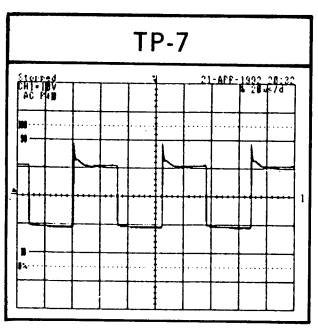
TP-5



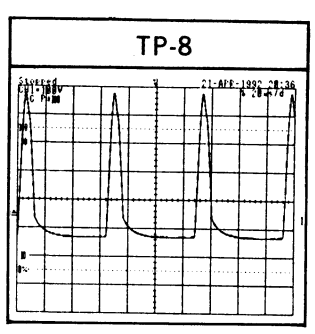
TP-6



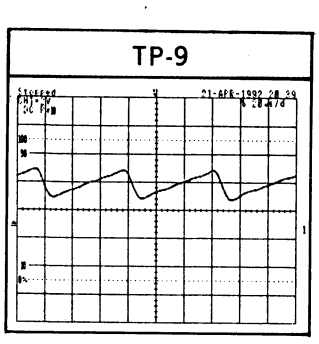
TP-7



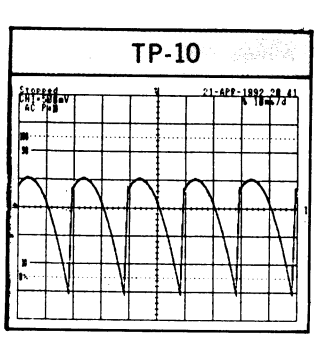
TP-8



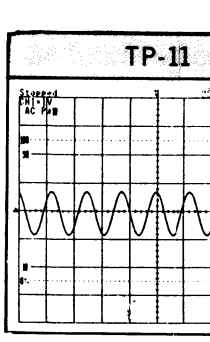
TP-9

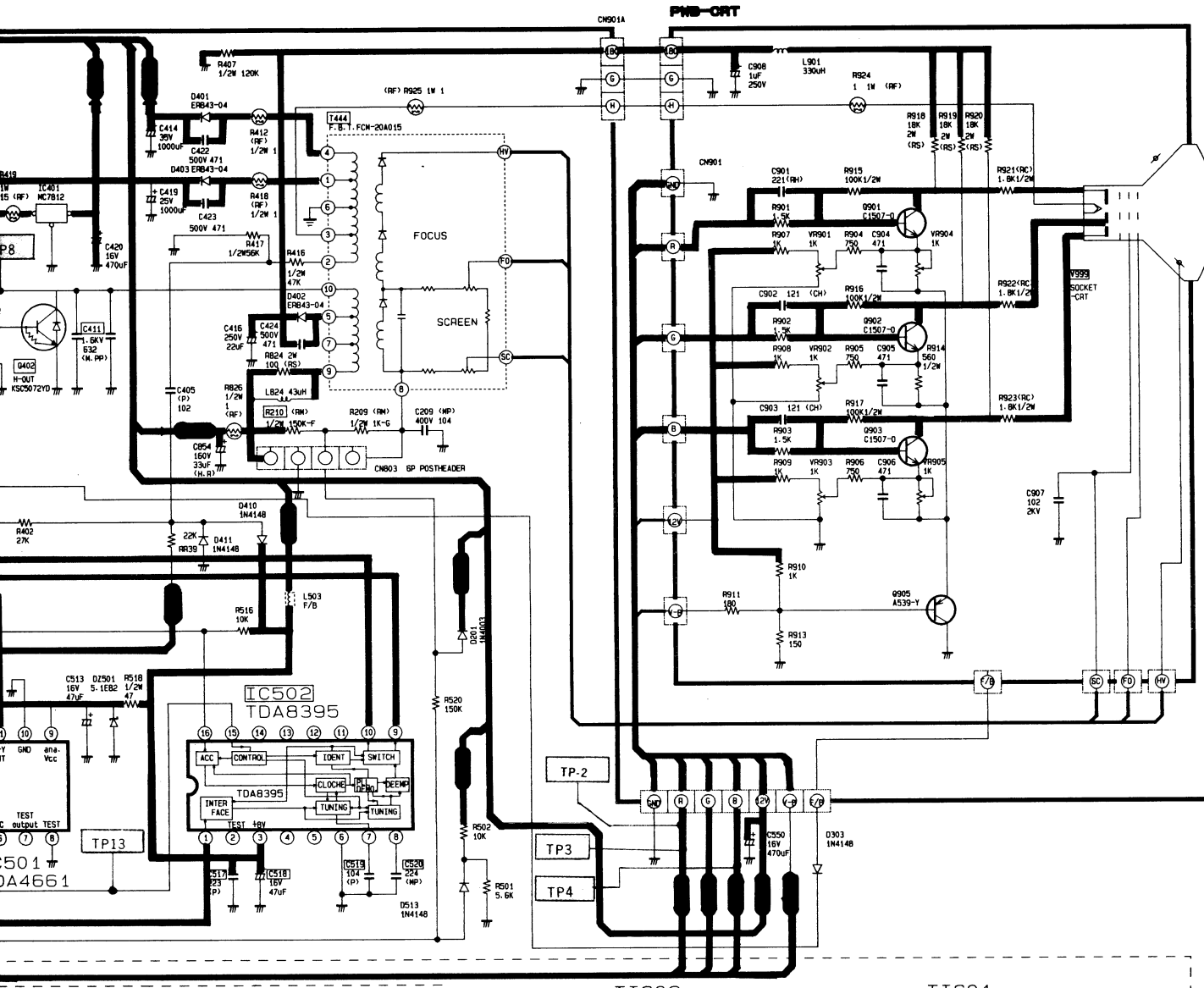


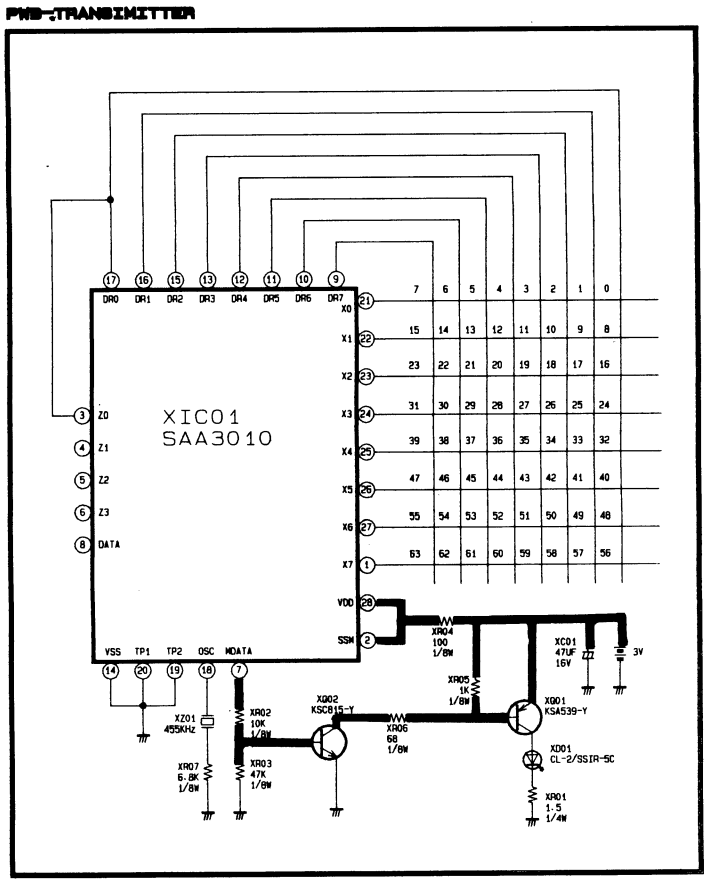
TP-10



TP-11







DIFFERNT PARTS FOR SYSTEM

LOC NO	PAL-B/G	PAL/SECAM -B.G	PAL/SECAM -B.G.D.K	PAL-I
IC502	DELETE	TDA8395	TDA8395	DELETE
C517	DELETE	POLY 223	POLY 223	DELETE
C518	DELETE	16V 47uF	16V 47uF	DELETE
C519	DELETE	POLY 104	POLY 104	DELETE
C520	DELETE	POLY 224	POLY 224	DELETE
C625	C-C CH 47	C-C CH 47	C-C CH 33	C-C CH 47
L601	12uH	12uH	8.2uH	12uH
Z101	DFWG1956	DFWG1956	TSF5321	TSF5305
Z201	TPS5.5MB	TPS5.5MB	TPS5.5MB	DELETE
Z202	DELETE	DELETE	TPS6.5MB	TPS6.0MB
Z203	TPS5.74MB	TPS5.74MB	TPS5.74MB	DELETE
Z601	SFSH5.5MCB	SFSH5.5MCB	SFSH5.5MCB	DELETE
Z602	DELETE	DELETE	SFSH6.5MCB	SFE6.0MB
R108	1/2W 470	1/2W 470	1/2W 470	DELETE
D101	1N4003	1N4003	1N4003	DELETE
C106	16V 47uF	16V 47uF	16V 47uF	DELETE
IC102	LA7910	LA7910	LA7910	DELETE
C121	50V 0.47uF	50V 0.47uF	50V 0.47uF	DELETE
C123	50V 0.47uF	50V 0.47uF	50V 0.47uF	DELETE
RR21	1/8W 10K	1/8W10K	1/8W10K	DELETE
RR20	1/8W10K	1/8W10K	1/8W10K	DELETE
L104	5.6uH	5.6uH	5.6uH	DELETE
L105	5.6uH	5.6uH	5.6uH	DELETE
TV001 O-B H-B	TECC2985VA14B TECC2989VA15B	TECC2985VA14B TECC2989VA15B	TECC2985VA14B TECC2989VA15B	TECC2985VA14B TECC2989VA15B
RD02 O-B H-B	DELETE IN4148	DELETE IN4148	DELETE IN4148	DELETE IN4148
RD05 O-B H-B	DELETE IN4148	DELETE IN4148	DELETE IN4148	DELETE IN4148

DIFFERNT PARTS FOR INCH

LOC NO	14 INCH		20 INCH	21 INCH
	NORMAL	MINI-NECK		
R210	1/2T 133K-F	1/2T 133K-F	1/2T150K-F	1/2T150K
R925	1W 1	DELETE	1W1	1W1
C411	1.6KV 722	1.6KV 632	1.6KV632	1.6KV632
C417	200V 364	DELETE	200V 434	200V434
L404	K-20/195uH	DS48-157uH	DS48-157uH	DS48-157uH
Q402	2SD1650	2SD1650	KSD5072YD	KSD5072YD
T444	FCM1415AL	FTK004AP	FCM20A015	FCM20A015
V999A	3702B22 A34KGX41X	A34KQV42X	51GGB95X A48KRQB2X	54HGB99X A51KREB3X01
V999	B12-262BASE	HF-22.5A	HF-29.1S	HF29.1A
R304	1/2W 680	1/2W 680	1/2W 680	1/2W330
MR001	DELETE		DELETE	
MR002	DELETE		DELETE	
MR003	1/2W1.2K		1/2W1.2K	
VR402	DELETE		DELETE	
R306	1/2W 1.5	1/2W 2.2	1/2W1.5	1/2W1.5
C309	POLY472	POLY272	POLY472	POLY472

EXPRESSION

1 Resistance is shown ohm K=1.000 M=1.000.000
2 Unless otherwise noted in schematic all capacitor values less than 1 are expressed in ufd. the values more than 1 in pF.
3 Unless otherwise noted in schematic all inductor values areexpressed in uH.and the values less than 1 in mH.

NOTE

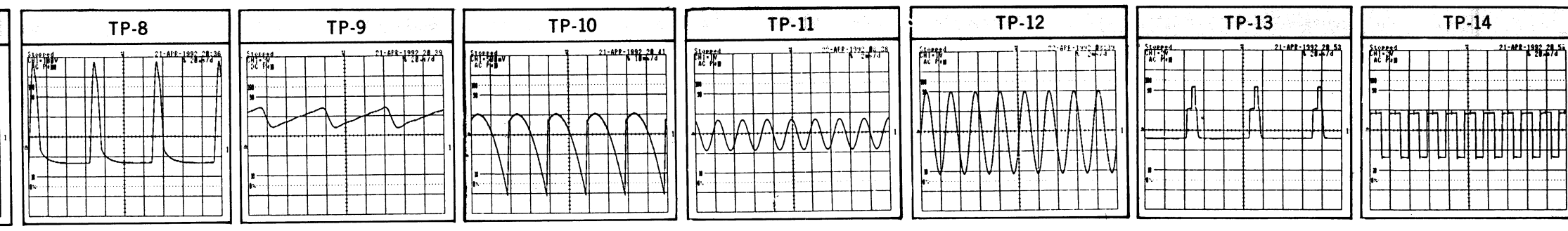
The circuits are suject to change without notice to improve the picture quality.

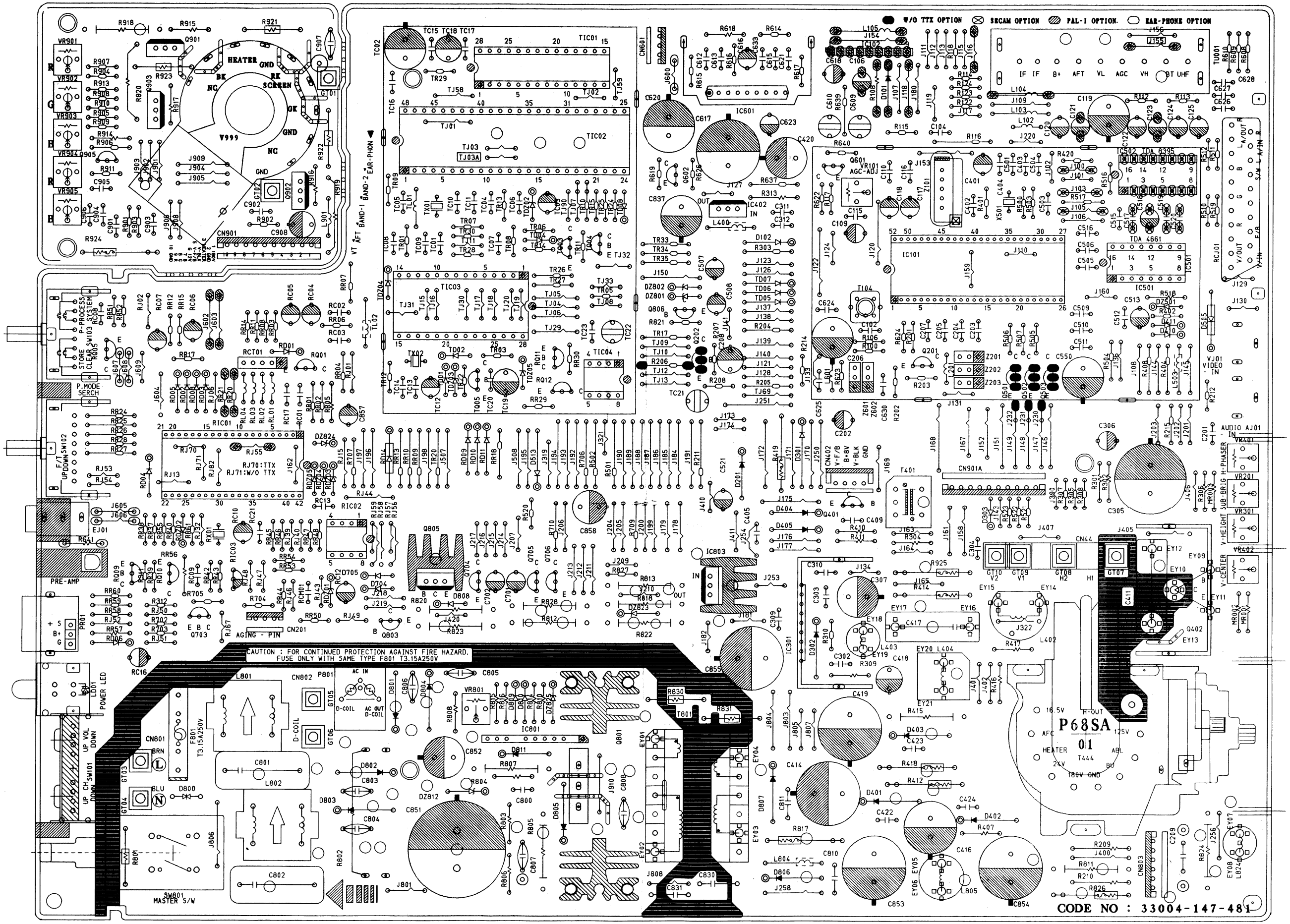
RESISTOR	
Carbon	No Mark
Composition	(RC)
Metal Oxide	(RS)
Metal Film	(RN)
Fusible	(RF)
Cement Wire	(RW)
Network	(RN)

CAPACITOR	
Ceramic - SL	No Mark
Ceramic - RH	(RH)
Ceramic - CH	(CH)
Polyester(Induct)	(P)
Polyester(Noninduct)	(PMU)
Polypropylene	(PP)
Metal Polyester	(MP)
M.P.Polypropylene	(MPP)
Tantalium	(T)
Non Polar	(NP)

DIFFERNT PARTS FOR TTX GROUP

LOCATION	3GROUP	4GROUP	5GROUP	6GROUP
TIC03	MAB8461PM115	PCF84C81P/CTV972	PCF84C81P/CTV972	PCF84C81P/CTV972
TIC02	SAA5246P/E	SAA5246P/E	SAA5246P/H	SAA5246P/H
TX02	6.0MHZ	9.8304MHZ	9.8304MHZ	9.8304MHZ
TR12	1/8M1M	DELETE	DELETE	DELETE
TC13	RH30	DELETE	DELETE	DELETE
TC14	RH30	DELETE	DELETE	DELETE




W/O TTX OPTION
SECAM OPTION
PAL-I OPTION.
EAR-PHONE OPTION
IF IF B+ AFT VL AGC VH BT UHF
HEATER
GND
BK
NC
RK
SCREEN
GK
GND
V999
NC
GND
CAUTION : FOR CONTINUED PROTECTION AGAINST FIRE HAZARD.
FUSE ONLY WITH SAME TYPE F801 T3.15A250V
P68SA
01
CODE NO : 33004-147-481